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No. 2

TENDENCIES OF MODERN SCIENCE
OR
SCIENCE AND MODERN LIFE

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or

SCIENCE AND MODERN LIFE

by

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TENDENCIES OF MODERN SCIENCE

INTRODUCTION

PERHAPS the most remarkable result of the scientific discoveries of the last century has been the realisation by the public that time is a most fundamental fact in all human life and activities. Men are beginning to cast aside prejudice born of the truth that their lives are, scientifically speaking, short; they are attempting to obtain something far better than a bird's eye view of the universe.

It is important, therefore, that we should know relationship between time and our own existence. In the same way as a boy or girl is called upon to choose a profession, men and women should decide how they are going to think. Modern science has established that the choice of brain manipulation available to everyone is illimitable.

It is possible to conceive for instance, of someone suddenly discovering that the atomic theory is to be believed, and from that moment endeavouring to make up his mind whether he will collect atoms or money or if he wishes to use the theory of the continuity of matter to convince himself that an after-life is the only logical point to which he can devote his mind.

A man or woman might decide that modern spiritualism is entirely untrue, and in that case it would be essential for any normal being to give up the remainder of life to improvement of the receptive bodily system. He would argue that if life is a fact, and not merely a dream existing in the mind, the senses available must be amplified or increased to their fullest possibility.

Our method of thought and even our way of life must be dictated by what is believed. If we credit that there are other inhabited worlds, perhaps worlds in which spirits exist without the necessity of a body, we must strenuously avoid all contact with this earth and welcome blindness as a heaven-sent link with the future. Such a being could never travel by motorcar or read Bernard Shaw, because these things would remind him of his body, while his opposite, believing in the fullest development of the senses on this planet, would spend all his time crossing the Atlantic to discover whether the latest surgical methods in America could afford him additional physical beauty and time.

Science no longer merely attempts to collect and classify facts, for the excellent reason that we know facts do not exist. The scientific discovery of to-day is proved to be untrue by the "facts" discovered to-morrow, and these "facts" in their turn are shown to be "incorrect." The statements of the average man are divided between the things which he believes but knows to be untrue, and the average ideas of his friends or newspaper. Science still depends in the minds of many people upon

geography. Actually it is a life, and the only life which any intelligent person can pursue.

The point I am illustrating is that Science is not so much a matter of facts or learning as a manner of thinking. Most important of all this is the correlation of our lives with Time. If we can realise that change, besides being the spice of life is life itself, and that matter can never be destroyed, but only changed in form, we shall begin to build a better view of existence and cease to resemble a centenarian tortoise enquiring into the habits of a moth that lives for only a few minutes. I must point my argument by indicating that human senses can only respond to change and that it is useless to hold the hand of a member of the female species unless the sensation is constantly renewed by altering the position of the fingers.

Once it is grasped that the world, our lives and our thoughts, are all made up of electrically "driven" particles or electrons, it becomes easy to explain such natural phenomena as lightning, a boxing match or a fashionable wedding, not to mention the reasons for war, love, ambition, down even to marriage. Knowledge of any of these subjects also qualifies us to understand the state, now believed to exist in Russia and briefly described in Utopian Opera as Ruritania.

It will be my aim in the following chapters to show modern science in relation to our everyday life. Science is no longer an affair of chemicals and test tubes in a laboratory. Every discovery has to be brought into relationship with life, while

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apparently inexplicable phenomena, such as the custom in certain parts of America of eating peas and cheese with a knife, can be explained in the light of modern science.

Orthodox believers in religion sometimes find their faith shaken when "God allows" their youngest child to be run over by a motorcar. From the religious point of view this, like the erection of a lightning conductor on a church steeple, can only be explained by casuistry; but the scientific thinker finds that even such sad catastrophes fit perfectly into the scheme of real life. The scientist is, for this reason, often accused of being "material," but nothing could be further from the truth. A study of science, more than any other subject, is calculated to dispel a tendency towards materialism, although the technician is not a sentimentalist in the sense that he persuades himself into believing things which he knows to be untrue. In short, he is suspicious of faith.

It is obvious that science plays a very important part not only in the moulding of our conduct, but also in every action of our lives. Our attitude towards murderers might well be altered by the discovery of a hitherto unsuspected bacterium just as the entire relativity of "work" and "play" is dictated by science. A hundred years ago walking was merely a method of "getting there." Now that motorcars, railways and aeroplanes accomplish this desire so much more quickly than legs pedestrianism is regarded as a recreation. The man of two centuries ago would probably be surprised to find that people

preferred walking in an age of cheap mechanical transport, simply because he did not understand the scientific nature of change.

The education of the public in science has been sadly neglected and the present awakening interest in this most important principle is the only hopeful sign for the future. I venture to suggest that if every boy and girl had been taught the nature of combustion and the effect of burning coal at school, we should not have our cities clouded by fog or the wealth of our mines dissipated through a million chimneys. It is, we hope, because they did not understand, that this atrocity was allowed by our fathers. However brilliant the scientist bred by a nation, it is the attitude and knowledge of the average man and woman which must entirely decide its final hope for progress.

While science does not supply the answer to every question it certainly provides a method of thought. The attitude of the scientist is a constant application of "why" and "how?" It is by this method alone that he may acquire knowledge. He is not content to know that a thing happens, but must know why and how it takes place. He has long since learnt to take nothing for granted and to realise that accuracy is a purely relative term.

The understanding that results from pursuing this line of thought is likely to increase happiness if carried to a fearless conclusion. All the troubles of sex are due to the ignorance and false dignity which cloak the exquisite happenings of nature under half meanings and irreverent suggestion. People who are afraid of lightning are those who do not under-

CHAPTER II

THE SIZE OF THINGS

THE ORDINARY person speculates very little upon the size of things. He is content to think of an elephant as "big" and a fly as "small," while his offspring fears one and indiscriminately kills the other. Obviously no such generalisations are possible to the scientist, although modern research suggests that we are reaching towards the biggest and the smallest things that can exist or that the human brain can conceive. It may be argued, however, that there are no limits in either direction, that there is no logical reason why the term "infinity" should not be taken literally in its application to things both big and small. The same was said at one time of speed—that there was no reason to believe why a particle should not travel infinitely fast.

Our ideas are changing, for now it seems that if a particle of matter could be made to move faster than light, which has a velocity of about 186,000 miles a second, it would automatically cease to exist. Einstein's statements are theoretically valuable and are therefore liable to be upset. At the moment this theory agrees with the best known opinions and is conveniently accepted for lack of a more complicated suggestion.

sufficiently educated to prosecute this idea, for there is no doubt that a few generations will find the idea of four dimensions as easily appreciated as that of three. Already we have mooted the "fifth dimension" and undoubtedly as man's capacity increases he will speak freely of matters which to-day he can only imagine with difficulty. Even to-day few people can grasp the principles of national finance which seem so obvious,—to their exponents.

I will not attempt to explain relativity as propounded by Einstein. The inventor of the theory himself has said that the only simple definition he can give is to "imagine a tennis ball turned inside out without being cut and you have relativity." Alternatively if you can picture a knot in a string with both ends secured and this knot unravelled without the ends being moved you can see the working of the fourth dimension. But I would point out that when we speak of size in any way we speak relatively. Also ignorantly.

Subconsciously we have certain standards. We ask someone to walk "fast"—that is fast according to some standard we have set ourselves. Few people realise that if everything were twice as big when they awoke to-morrow they would notice no change whatsoever. As it is, scientists have suspected that the universe has a "drift" through the aether which is difficult or impossible to measure because we have no fixed spot upon which to bear. If you were encased in a room and towed at sixty miles an hour, you would not notice any motion because everything else visible would be moving.

at the same speed. Indeed, it was through the efforts of scientists to measure this possible "drift" through the aether of the universe that the theory of relativity was propounded. It has led to many amazing corollaries—for instance that a train travelling in one direction at what we call sixty miles an hour is moving faster than a train travelling in the opposite direction and also running at apparently sixty miles an hour. Or again, that a "yard stick" is longer when it lies in one direction than when it is in another—the impossibility of discovering the difference being due to the fact that the scales used to measure, also change in length when turned round.

The difference between positive and negative direction is obvious to anyone who has noticed the difference between those going into church and those who are leaving.

Even ordinary size is dangerous. There are many parts of a woman's body which would lose all attraction if magnified to the relative size of St. Paul's Cathedral, depending upon the position of the observer.

These suggestions can easily be extended by those who are interested in mathematics. Relativity and the fourth dimension would be of incalculable value in the realms of company promotion and I do not doubt that with increasing knowledge our idea of direction will become so graphic that we may ultimately discover the secret of "seeing backwards or forwards" to a pleasant degree. How dangerous this will be in a country whose morals are even now being steadily undermined by continental broadcasting.

Imagine a period of sacred silence extended automatically to one year. Realise how hard it would be to live in a town which also housed a divorced wife in days when distance is without meaning. Yet all these things are little more strange than a cinematographic representation of a rose in bloom or of a banana eaten backwards on the screen.

To return to the subject of infinity. Einstein's theory of curved space suggests that there is a definite limit to the universe—that "infinity" is a measurable distance. Dr. Hubble, the famous American astronomer, has calculated that space probably extends about one thousand times as far as the furthest nebula visible in the most powerful telescope in the world. If we looked beyond that, he suggests, we should see ourselves, not, of course, as we are to-day, but as we were many billions of years ago!

The idea is easier to grasp if we take the case of wireless signals. Most people are aware that radio signals can be transmitted and picked up again at a receiving station next door in one-seventh of a second. During this time they have travelled completely round the globe. If the universe is constructed as Einstein suggests, then a similar law applies to light, except that instead of occupying about one-seventh of a second to perform the round journey, the light rays require many hundreds of million years to deal with the new finite conception of other people's infinity.

That inhabitants of certain planets might enjoy the doubtful delights of chariot racing on this

Biological investigation has revealed the most minute changes in our bodies. We have reason to believe that matter is not altogether the "dead" thing we consider it to be, that the "dead as a door-nail" metaphor is not, perhaps, scientifically correct. It is even suggested that crystals have sex. Surely this knowledge should have a profound effect upon our thought, even upon our business and life?

To realise that the mere act of remembering a telephone number causes certain movements or changes in the cells of the brain that can be electrically measured and recorded is a step on the road to securing a true vision of purpose. Most important of all, the scientist now knows from experience that there is no such thing as a fact. He once believed that the molecule was the smallest particle of matter. Now he speaks of electrons and protons. He may in the near future need more extensive changes to account for his wishfulness to live in a hero's world from which sex and warfare have automatically disappeared.

Perhaps worms are justly unpopular in religious circles.

While astronomers have been striving to reach the limits of space, physicists have been equally hard at work in their attempts to see and measure the smallest particles of matter. So minute have become their measurements that a new unit of length has had to be invented, the Ångström, one-ten millionth of a millimetre. From time to time we read of the invention of microscopical devices which enable a particle only one Ångström length to be seen, but it is definitely established that particles of colloidal gold, having a diameter of 17 Ångströms have been seen through the microscope.

Science commonly measures particles and distances that have never been seen. The wave length of X-rays is easily checked, but the nearest approach to the observation of the atom is an experiment in which the particles shot out by radio-active matter are bombarded against a specially prepared screen, minute flashes showing the impingement of the helium atoms.

Our knowledge of what takes place inside the atom is largely based on theory. I have read a picturesque account of an imaginary voyage by an imaginary man, some millionth of a millimetre in height, inside an atom, but fascinating as this form of speculation may be, it is only theory. The best that can be said is that the theory agrees with some of the alleged facts. Improved knowledge will undoubtedly result in a better theory—just as the once fundamental atomic scale has been modified by later research.

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CHAPTER III

LOVE AND PSYCHOLOGY

SCIENCE is so badly defined as the ordered knowledge of natural phenomena that, at present, psychology receives the title of a science on sufferance alone. "When I add sulphuric acid to barium chloride," says the chemist, in effect, to the psychologist, "I know that I shall cause a white precipitate, and this is the same whether I perform the experiment to-day or to-morrow. I can also collect the result. But when Brown, whose soul you have dissected, meets Robinson, whose soul you also dislike, neither you nor I can tell what will happen; therefore psychology is not a science."

This argument need not concern us in the least, for if psychology is in an embryo condition it is obvious that it is our most important addition to the study of mankind. I doubt, for example, if scientists will be long content for men and women to treat so vital a force as love as a matter for jesting, or as a nuisance that, at best, interferes with the continuity of serious work. We should welcome affection as a source of power and make up our minds to employ its psycho-analytical value rather than countenance a wastage of the greatest force of all. Love can be likened to a boiler. Directed into the proper, or even the usual channels, steam

can be of immense use to man, driving liners across the Atlantic or converting power to light a thousand homes. But neglected, or subject to interference, it will refuse to function and at any moment may cause an "uplift" of highly materialistic nature. Our divorce courts and prisons are filled with amateur engineers who have been injured in explosions of this character.

It is beginning to be recognised that attraction and repulsion are found throughout Nature. Even atoms are attracted in certain ways. Now if the chemist has found that magnesium, for instance, is attracted under certain conditions towards oxygen, why should not the psychologist discover the reasons for happiness in human beings and be able to point out with certainty that Mr. and Mrs. White will never produce a black, but will continue to minister to the vanity implied by a lack of independence in the selection of window curtains or underclothing. This passes for loyalty in middle-class circles.

The extraordinary power of love and similar forces can easily be illustrated by producing the progress curve of history. It is a commonplace joke that the Roman Empire was a factor of Queen Cleopatra's nose. Truth does not end at a nose, so if love can start a war surely it can be put to milder use? The history of engineering is largely a record of combat between man and nature. Man has mastered the wind to a degree; he is even trying to harness the lightning and the tides. Can we not employ, I use the word in the best sense, that strange force we call love? I certainly think that this is

one of the greatest of all scientific problems that must be solved by a coming generation if their subscriptions to the League of Nations are "to be continued by the next."

To investigate this matter adequately it is essential to discover the cause and methods of transference of this force. We know that one sense alone is not sufficient for love. We speak of love at first sight. But sound, and scent also play a part in the attraction of human beings, who require an increasing number of sensory paths initially to set emotion into play. Dancers ask for shaded lights and swinging floors; they could not perform in bright sunlight to an accompanying smell of ozone or sardines.

Every meeting between the sexes is fraught with some aetherial exchange, for touch, sight, sound and smell are called into service with other senses seemingly atrophied in human beings. It is not known why moths are drawn together from a distance; even the integration of movement by homing pigeons is hard to explain. It is the duty of science to find out how far can a combination of our receptive senses produce what we deem to be real; the humble talking picture will not always be sufficient.

If propaganda is ever of importance we may conceive the projection of personality to a degree which permits ambitious nations to persuade those less blessed by the exhibition of living pictures of warlike preparations which only exist in the minds of those responsible.

Most important of all are the senses which we cannot yet analyse. It may be imagined that the

operation of the mind is an electro-chemical process that generates aetheric waves, and if this is so, it is probable that love and many other emotions are the result of indirect rhythm. Almost every human organ, from the heart to the eyes, is rhythmic in movement. Is it too much to suppose that mutual emotion is the result of some heterodyning between the emissions of two people?

Passion does not explain love or even marriage. The very young are often sufferers from an excessive glandular output but they always retain sufficient sanity to select from the many opportunities which are offered in any civilised community. The capacity of the barnyard cock has been subjected to much comment, although even poultry are not entirely subservient to change; the subject has a far wider and more useful application, for if we could analyse these actions more completely it would be a comparatively simple matter to adopt the best profession for any man or to choose an ideal wife.

A theory such as this explains love at first sight equally with the life of the man who turns from one woman to another. It also explains, perhaps, why "love" becomes less strong with age, simply that the waves have less amplitude. Technically the sixty-year old philanderer with a girl on his knees is like a man who has "lost his voice" trying to make himself heard in the Albert Hall.

Curves could be plotted showing that synchronism occurs once in six months and that at other periods the waves and their possessors are quite out of step. The method fully establishes that family relations,

not function fully until they have been subjected to this rather hypothetical force which is at issue.

If, as we have reason to credit, our lives are based on rhythm, then the study of these movements will enable us to live more easily and peaceably with our fellow creatures. We shall understand that a quarrel is, in scientific language, merely the jamming of our oscillations by those of another, and that should we meet at some other time, we should perhaps heterodyne and agree. But we would not risk a mutual dwelling and we would realise that our distorted waves were bad for the world in general. It may be necessary for the increasing mental sensitivity, for unhappily married persons to be shut up in lead-lined boxes if they still insist that society demands co-habitation. Gold could replace lead with every success in most instances.

If only psychology can explain the actions of others a step forward will have been taken. In every dispute both sides are wrongly convinced that they are correct and broadcast the deplorable spectacle of two right-minded men bickering about some petty problem. I do not apply this statement to the female sex, for I understand that to understand is to sympathise, and I know that this implies a grasp of geological time.

From a world-famous Institute comes news of an experiment that may shed new light on the unsolved problem. The experiment, colloquially, was to grow an onion. The speed at which the onion grew was carefully observed. Then two onions were grown side by side, and extraordinary

to relate although all other conditions were the same, the onions grew more quickly. The experiment was repeated with flies. Some flies were confined in a vessel and they refused to breed in normal fashion. Then more flies were placed nearby in another jar and both pairs proceeded to multiply exceedingly. If all matter lives, we may soon comprehend why certain rooms are almost as irritating as many people.

Obviously further experiments must be made, but the immediate conclusion is that living matter flourishes differently in company with other living matter. Whatever the communication between the flies, it was not smell or sound, for they were confined in bell jars. If it was some ray or form of vibration of which we at present have no knowledge, it has some unknown wave form and is generated by mechanism almost infinitely small in comparison with any clumsy transmitters that we can picture.

The speculation that can be made from these experiments is vital. It may be that civilisation, instead of being the cause of men living in communities, was the result, perhaps the proximity of other human beings stimulated mental activity, possibly there are people who should be segregated at once.

We will all subscribe to the latter view and continue to prove that this hypothetical method of communication explains love, war, hate and many other comparable affairs.

There are many forms of manufacture which recent experiment suggests, may be affected by

aetherial oscillation. It is well to explain that if wireless makes hair grow or affects the weather proof is difficult to establish when selectivity in transmission is still hopelessly beyond our ken.

Recent biological research suggests that human behaviour will ultimately be explained on scientific grounds. While psychologists have dissected the behaviour of abnormal people, biologists have been revealing some of the secrets of the human body. They have shown, for instance, that certain actions are almost entirely dependent upon glands and their secretions. They have proved that a dose of adrenalin may make a man a hero, that a deficient pituitary gland may make him a criminal and that purely physical deficiencies may result in his becoming one of the freaks which delight the psycho-analyst. The man who hesitates before jumping into a river to save a drowning child is not, scientifically speaking, a coward, but a victim of specialised secretion.

It is, I think, because psychologists have concentrated on behaviour rather than its cause that this science has only just left the realms of the music hall. They explain one action by a thought, and each thought by another. There will come a point in the near future where the new biologist and the psychologist will meet and it is then that we shall have the foundation of a really useful science rather than a mere explanation of obviously atavistic dreams. The explanation of actions resulting from mental and physical causes of every kind is what we require in order that we may less nearly resemble

the savage in general lack of control. There are already too many dogs and half-breeds on our streets.

Peculiarities are naturally interesting to women, but this should not imply that mixed marriages are only permissible when backed by a bank, or that unions with the old and wealthy are due to reasons which are not capable of normal physical explanation. We might usefully remember that love may be produced by many psychological and physiological causes. The creation of a complex of desire is familiar to those who have observed that it is the man without a roof to his mouth who endeavours to talk the loudest.

Whatever may be the vital forces which we shall discover they will be of incalculable importance. The germ of life in the beginning is microscopic, yet in that speck, invisible to the human eye, is the making of a master musician, the hand that will paint great pictures, or the brain that will beget some revolutionary invention. Surely it is these forces that we should study rather than the transmission of a "family nose" or a square jaw? Inherited memory is easy to believe, for we do not know how far the cellular composition of the mind can govern any tendency. Memory is our life but we still deal in its effects rather than test its cause.

CHAPTER IV

DOCTORS AND MEDICINE

IN POPULAR newspaper competitions when readers are asked to state what they value most in life, a large proportion invariably answer "Health," and it is undoubtedly true that even in this commercial age the majority of men and women value their bodies above all else. Spiritualism has as yet much to establish.

Is it not extraordinary, then, that doctors whom we pay to keep us well have discovered nothing to stay the course of such commonplace illnesses as a cold or measles? Man who has subjected the elephant may still be incapacitated by a mosquito or a microscopic organism. Every improvement in mind renders him easier of attack by forces we cannot fathom.

The reason, perhaps, is that until recently medical men have been obsessed by the idea of miraculous cure rather than miraculous prevention. Even to-day some remedy that enabled the blind to see would be heralded with greater publicity than an invention which protected our eyes from the conditions imposed by civilisation. Of all scientists, doctors have been the very last to shake off the effects of mediæval quackery; even to-day the country practitioner who visited his patients in a hygienic white suit instead

of the time-honoured black coat and top hat, would probably lose much of his practice! The care is not altered by instituting a valet-serviced tweed.

Possibly because they deal in matters of life and death, doctors have always resented new discoveries and been slow to adopt the simplest mechanical device. The prejudice against vaccination, anæsthetics and disinfectants is now a matter of history. It is still difficult to obtain a really unbiased and open-minded examination of the most hopeful discovery which chances to be the work of a layman. Yet it is noteworthy that almost every advance in medicine has resulted from the work of those outside the medical profession. X-rays, ultra-violet light, the microscope, chloroform, insulin and a hundred other modern inventions were discovered by the public and adapted by medicine. One pities the plight of the surgeon who has not benefited by the teachings of photography.

Medical matters have now become a matter of national importance, yet the laymen in charge of the nation's health do not seem to grasp the value of research. The Government subsidises experimental work to a degree, it is true, but if £10,000 can be offered for a heavier-than-air machine that will rise vertically, is it not worth while offering ten times this sum for a cure of cancer? This disease alone must cost the country many millions in a single year. It is pitiful to think that the stereotyped teachings of a hospital are the best we can accomplish towards a knowledge of a series of structures which may vary far more than the leaves of a tree. We

CHAPTER IV

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Medical matters have now become a matter of national importance, yet the laymen in charge of the nation's health do not seem to grasp the value of research. The Government subsidises experimental work to a degree, it is true, but if £10,000 can be offered for a heavier-than-air machine that will rise vertically, is it not worth while offering ten times this sum for a cure of cancer? This disease alone must cost the country many millions in a single year. It is pitiful to think that the stereotyped teachings of a hospital are the best we can accomplish towards a knowledge of a series of structures which may vary far more than the leaves of a tree. We

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The effect of modern methods of medical treatment on the world have yet to be fully observed. How often do we read in the newspapers of an epileptic woman who has undergone a successful operation for the removal of sterility? Such action is sheer madness and must eventually lead to ruin. Nature is far more merciful than some God and man far more ignorant, but an offspring of progeny in such a case seems safer than a brood of children who may also be affected with the same disease. Man, in the wisdom of the knowledge he has acquired, gives the woman the gift of sterility which Nature has denied, in order, perhaps, that he may fill his lunatic asylums or have a comparative issue in reference to illegal marriages. Unfortunately, such results cannot be long delayed.

There are at present about 400,000 men and women in the lunatic asylums of the British Isles. It is not to suggest that this number could be reduced by sterilisation of those suffering from any mental disease and by research into the prevention and cure of mental defects. The treatment of the mind has lagged far behind the treatment of the body and our modern methods are but

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There are at present about 400,000 men and women in the lunatic asylums of the British Isles. I venture to suggest that this number could be halved by sterilisation of those suffering from hereditary mental disease and by research into the causes and cure of mental defects. The treatment of diseases of the mind has lagged far behind the treatment of the body and our modern methods are but little better than those of the Middle Ages. The universal treatment is to confine the patient, usually in proximity to others suffering to a greater or less degree from the same affection, and a cure is considered of secondary consideration, or impossible. The position is much the same as with criminals. We lock them up, not because we think confinement

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will work a cure, but simply because we do not know what else to do with them. Why not attempt surgical correction? It is a terrible reflection on civilisation, this question of lunacy, yet there is no law preventing a lunatic from having lunatic children! Is it to be wondered at that in Cornwall, for example, one person in every eight is more or less mentally deficient?

The great difficulty is, of course, to obtain a definition of lunacy, and it would be a tragedy if this definition were left in the hands of doctors—notoriously superstitious and unimaginative men. Our greatest poets and artists might have been condemned as lunatics because they saw “visions” which did not, so we are assured, actually exist. In any dispute, medical men might well adopt the attitude that those who did not agree with them were lacking! History records numerous persecutions and the discoverer of a new bacterium might find himself in an asylum as a sufferer from hallucinations!

Personally, I would say that the doctor who carefully washes his hands after examining a patient, but wears a rough coat harbouring a myriad germs is guilty of illogical thinking and unscientific practices. Doctors still persist in writing prescriptions in obsolete figures and symbols, and even the lesson of accidental deaths from badly written notes has failed to mend their ways. I suggest that no doctor can call himself a scientist who does not use a typewriter. He would laugh at the man who prescribed “a cow’s tail taken at midnight” for a cough, yet he continues to use antiquated methods

himself, as part of the mediæval idea that medicine is a mystery!

The obvious explanation is that doctors cloak their ignorance under a top hat and make up for their lack of knowledge by a flourish of the stethoscope and a shake of the head. Not until they realise that they are scientists and act accordingly will medical science make rapid strides. That it has accomplished so much is a matter of wonder, a tribute to faith healing and a compliment to the most honourable body of men who ever walked the earth or sent in a bill.

There has been a marked reluctance on the part of medical men, and indeed of technicians, to face the philosophical and sociological results of their research. Recent discoveries and experiments suggest that in the future it will be possible to graft many new organs to the human body. During the war new tissue was grafted on to many thousands of badly wounded men. Why should it not be possible to graft a liver, or even a heart?

There appeared in a New York paper some time ago an advertisement for a human ear. Now since a man can live without an ear, but not without money, there is no reason to express surprise at the fact that there were two hundred replies to that announcement. What, in the future, is to prevent men from selling their glands, their arms, hair and even their vital organs, so that some rich, but useless, man, shall acquire new life and continue to exploit the world? Chinese criminals are already said to be able to buy substitutes for small sums; will

civilised world go to the savages, who welcome death, and purchase from them the most unmentionable organs? It is a great problem and it may well be necessary for Governments to regulate this traffic in bodies, ensuring that those who receive a new lease of life at the hands of the surgeons are not only rich, but useful. There is now a man comfortably walking the streets with the blood and left leg of another individual; news that should be gratefully received as fodder by the beauty doctors, associations, and societies for preventing most things all over the world.

The grafting of glands is another matter of supreme importance. Monkeys and the lower animals are used at present, but experimenters have already acknowledged that human glands would be more suitable and there could be no difficulty in obtaining the necessary subjects for experiments, but for the laws of various semi-civilised nations. To prolong the span of human life is an excellent object, but we must make sure that the particular life is worth prolonging. There is no reason to suppose that the world would be in the least degree better for the extension of the life of a wealthy libertine, yet it is this very type who would pay for a new lease of activity. I have an idea for an excellent play in which an operation not only changes the natures of two women, but where the hero enters the garret, throws a cheque on the table, and remarks, "Lizzie—I've sold it!! . . . Curtain!

Another grave problem which science must face in the future, is that of ectogenesis. In spite of all

that can be done by modern inventors, women are still physically and mentally handicapped by the burden of continuing the race. The females of wild animals are not so handicapped. The elephant carries its young for twenty-seven months, but will continue working throughout this period. The opossum, which has to be active to survive, bears its young after only eleven days of pre-natal life. Women are handicapped for many weeks every time they bear a child. If they succeed in gaining political power, they may well insist that they shall be allowed to do all that is possible to reduce this ghastly burden, even if it calls for a special race of human incubators who sacrifice themselves for the common good.

A remarkable discovery has recently been made which bears on this subject. Certain experimenters have been studying those intricate substances called hormones. They have found that treatments can be evolved which enabled rats to bear young that are, so to speak, five days old. In other words, the rats at birth are as developed as those of five normal day's growth. The discovery of a similar effect on human beings might be far-reaching in its consequences, for the long childhood and slow acquisition of learning is one of the great handicaps of human beings. The theoretical equivalent would be for a human baby to be born "six months old" and thus double the amusement capacity of the mother.

Another interesting problem which awaits investigation is the transference of knowledge from one person to another. When a great man dies his mind is lost to the world, except so far as it is left in the

shape of printed books. If his brain could be transplanted, so to speak, into that of a younger person, we should greatly increase the ability and learning of human beings. It has always seemed to me a terrible waste that we spend the first twenty or thirty years of our life acquiring knowledge discovered by others. By the time this material has been digested, the brain may lose some of its youthful brilliance and give small opportunity for original speculation.

The discovery of a system of photographing knowledge on to the brain would completely change the history of the human race. That such a thing is not altogether impossible is proved by hypnotic experiments. Young men have passed examinations in subjects of which they have no knowledge under the influence of hypnosis. An ignorant and uneducated woman has been made to work out the most intricate mathematical calculations under hypnosis. Is this not a signpost pointing to the possibility of "teaching" the young without compelling them to learn? It is inconceivable that the brain can act without releasing some form of electrical emanation which will eventually lead us to real telepathy or even the direct transference of matter.

In considering these problems the scientist is always confronted by a vast amount of prejudice. It would not be possible to detail some of the experiments now being made because of the outcry that would be raised. "It is unnatural" is the universal parrot cry. So, by this ludicrous standard, is a motor bus, tinned food and the daily paper. But where

would those who have such a passion against progress willingly exist without modern safe luxury? Remember that when anæsthetics were discovered objection was raised on the grounds that the Bible said "in vain and sorrow shalt thou bring forth children!" That was half a century ago, but the ordinary man has changed little. Brains to build aeroplanes are more useful than the gift of wings.

If medical science is to be a living force it must examine each avenue which suggests that the human race can be improved. Doctors have in their hands great power—it behoves us to see that they use it rightly without prejudice, superstition and mystery.

It is illogical to keep a chicken's heart beating artificially for ten years, to grow living tissue, or cause dwarfs to grow, when we allow the everyday problems of dirt, crime, and sexual perversion to stalk untouched past the very doors of a medical paradise.

CHAPTER V

WARFARE AND POLITICS

THE WHOLE tendency of thought in the civilised world is largely against warfare, yet it is impossible for the scientist to visualise a world without physical conflict. The war of the future may be economic, inter-planetary, or even spiritual, but it is illogical to imagine that it may be avoided. The combative instinctive is present in all vegetables, animals, and even, we believe, in matter itself. Man has not sufficiently advanced to conquer the urge of temper or sex. The presence of policemen in our streets is an admission that debate cannot bring back an absconding cashier to hear his counsel's encomium.

Science is frequently accused of being the cause of war and of making war more terrible. This is far from being the truth. Science is our one hope that there will be no war in the future. A study of the causes of international disagreement reveal that "misunderstanding" is by far the commonest. Wars resulting from ambition or religious belief are largely things of the past. It is no longer necessary for a starving nation to go to war to live. Modern forms of transport ensure that a good supply of food is available everywhere in the civilised world. Nor is religion a great cause of war, for science has shown that there is much in common in all forms of belief

and has provided a method of thinking that combats the natural tendency to fight. It is not justice to hold Christ responsible for the horrors of the Inquisition.

The accusation that science makes war more terrible is equally easily answered. It is true that poison gas and high explosives are not pleasant methods of warfare. But are they really more terrible than the poisoned arrow or the sword? A great deal of the terror of the last war was due to the changing mind of man. Professional soldiers are accustomed to blood and death. They are trained until the complex of pride and discipline exceeds that of fear, while amateur soldiers are more easily shocked. Further, as men increase the capacity of their brains, so do they improve their sensitivity to sights which bring laughter to the savage but appal "civilised" soldiers until immunisation brings its relief by time.

Scientific warfare is far more humane than were the methods of history. There were nearly 181,000 British casualties from gas during the Great War, yet of these men only 6,000 died. Bullets and high explosives killed comparatively few. Many of the gas casualties completely recovered. The fact is that the chemical warfare of the future will be comparatively respectable, the object of a striking force being to incapacitate rather than to kill. Moreover, modern methods of treating wounds, though still crude, are considerably better than those of mediæval surgeons who hacked off legs and arms without anæsthetics and used red-hot irons to sterilise. The "romance" that lingers round ancient

warfare is purely illusory. A "talkie" of an old-time battle would probably make us turn in disgust from the exploits of King Arthur and the Black Prince. It would help Empire builders who still think that war means flags, bands and women, to realise the truth if they were compelled to listen and look at a radio representation of modern slaughter.

Television and aviation are our great bulwarks against world warfare. The cheapening of flying and the discovery of a really practical method of television would do more to reduce the possibility of future wars than any number of hours' discussion by the League of Nations. As long as we are ignorant of the lives, the hopes and the ambitions of the men and women we call foreigners, so long will we continue to fight. When England could be covered, only very slowly, on horseback, we used to fight the Scots.

With improved methods of transport we began to mix with the Northerner and soon realised that they were not so very much better than other people. The result was that we ceased to fight, that Scotsmen discovered London was a profitable city and that we even intermarried. Much the same will happen with other countries in time. When the aeroplane brings the uttermost parts of the globe within a few hours' journey of each other, and television enables us to see events in the remotest lands we shall have a real understanding of the brotherhood of Man and regard national warfare in the horrid light of civil war.

That we have still far to go is indicated by modern "*manœuvres*." To the seriously-minded person it

seems ridiculous to flatter the professional soldier. The last war proved that he was little good by himself, for before he had begun fighting he demanded help from the despised civilians. Moreover, the professional resolutely sets his face against most improvement, although obviously his job is to kill as quickly as possible. The story of the inventor of tanks is well known.

No one boasts that his son is a slaughterer, or that for generations his family have been hangmen. Why surround the killing of men with false glory? Yet it is well known that a retired Colonel obtains credit with ease and is necessarily considered a valuable director of Companies. Sailors, it is generally recognised, have had little opportunity for education.

The League of Nations should point out that "officers" are not always pleasant or that the temporary gentleman was seldom employed upon the Staff and had no life of ease and pension to which he might safely return.

Although the natural process of war has now been demonstrated as an over-rated pastime, from the scientific point of view it has certain advantages. It hastens the clock that governs progress. Just as fights between wild animals, although they may result in the death of certain individuals, eventually result in better beasts, so with the human race, war often results in improved eventual conditions.

It is only right that this credit should be given to those who lost their lives. It would be better than any "silence," if we could all work harder

for one day to help forward the industries which were inaugurated by war.

Aviation owes the world a debt in this very manner. More progress was made in four years of warfare than, perhaps, in ten, of peace. The whole resources of the nations were thrown into developing the aeroplane as a weapon of destruction. Greater speed, reliability, and mobility were achieved. All that was learned in war is of inestimable value in peace.

The same conditions apply to transport. Warfare demonstrated the great value of the caterpillar principle, it developed the motor lorry and led to research in the methods of canning and distributing food. It was found that the gases used to destroy human beings were equally useful for the attack of insect plagues caused by man in his vain attempt to upset the balance of nature. It led to the search for many synthetic materials, and it compelled doctors to perform operations of grafting which may have very important results in the future.

The demand for nitrates led to the exhaustion of natural supplies, and chemists were forced to experiment and experiment quickly, in the production of nitrates from the air. Radio, the hydrophone, metallic alloys, and new fuels are further examples of war as a beneficent incubator for civilised comfort.

International language and currency would probably help to render wars less frequent. It is ridiculous to know that years must be spent in learning a foreign language so that knowledge may be acquired and that even then different meanings

may be attributed to a dozen words. In the very far future we shall probably discover the secret of transferring ideas, as distinct from words and sentences, direct to another man, but in the meantime an international language would certainly make for peace. That the ideas of the world are basic is indicated by the discovery of certain modern psychologists in connection with dreams, that certain forms are common the world over, regardless of race or climate.

History, solely of use in that we may elongate its curves to predict the future, deals mainly with war, but describes in a most ingenious manner the deeds of politicians responsible. It appears that, in almost every instance, men who were courtiers, financiers or merely impecunious, would call in the advice of others who had more at stake, for the sole purpose of reaching decisions which lost America and alienated South Africa. Ireland, as a savage country, can be neglected as an obvious dependency of Scotland.

Nothing is more striking in an examination of the Parliamentary system than the almost complete absence of constructive brains from among the representatives of the people. Ministers, soldiers, sailors, writers, doctors and members of many other professions are numbered amongst our Members of Parliament; but few scientists. Is it that the people believe the engineer can contribute nothing useful to the acts of government which depend for execution upon his creative labour, or is it that the scientist prefers to seek truth in the solitude of his

laboratory rather than notoriety and directorships in Westminster?

There are many books on "Political Science," but I have yet to be convinced that politics is an honest science. If there is any law of politics, it is abused to a degree which would be productive of fatal consequences in any other profession.

The mistakes that have been made in British politics alone by gross and ignorant neglect of scientific principles, are legion. If science had been adequately represented in the House by men of vision we should never have permitted the folly of local bills, giving councils power to undertake their own electrical works. As it is, we now have many different voltages all over England and the cost of standardising them and linking up the country into a network of power stations will lead to artificial employment and the loss of many millions of pounds. A technician could have foreseen what must happen and provided accordingly. The politicians all followed Gladstone who, like the old woman after seeing Faraday demonstrate electricity asked "What is its immediate use?" and took the reply "You will tax it very soon!!!"

It has taken the House of Commons many years to wake up to the fact that noise is harmful and wasteful. Even now we have passed Bills dealing with noise nuisances that are quite unworkable. An acoustical expert could have pointed out the absurdity of asking a policeman equipped with a truncheon or whistle to discover whether a motorcycle is noisy. The sensitivity of the human ear varies considerably,

before and after a heavy meal, and probably not a few motorists have been fined on the evidence of a constable with an empty stomach! The political control of rubber is another amusing instance. Value is increased by destruction and the artificial costs produced are taken as a basis for future valuation.

There is always the great danger that politicians will pass scientifically unworkable Bills. Some time ago there was a suggestion that for the prevention of accidental poisoning from carbon monoxide in coal gas, the gas should be scented with some suitable chemical. The politicians, of course, went no further than "suitable" while chemists know that at the moment there is no compound which is entirely practicable for this purpose!

Depression in the coal industry is largely due to the failure of politicians and business men to take the advice of scientists. Coal mining is not a matter of wages, costs and profits. It is a scientific business and I suggest that £100,000 spent on research thirty years ago would have saved the nation many millions to-day. But politicians and business men cannot leave "finance." They said in effect "here is a wonderful mineral which nature has lavished on Britain," and they proceeded to use it lavishly. They were blind to the fact that one day they would dig deeper, recover more, install new machinery and improve methods of distributing power. The royalties that should have contributed towards the cost of keeping the mines up to date were spent at Monte Carlo and on "super-yachts," with the result that thousands of men have lost their

employment and the industry is virtually bankrupt. Middlemen do not help us to dig prosperity from the earth.

Scientists long ago realised that to burn coal in open grates was like burning the Albert Hall to improve the view. One of the problems the engineer has always to face is to discern the cheapest method of distributing power which can but be converted and never created or lost. Old-fashioned railway trucks are a most inefficient method of distribution. Giant power stations should long ago have been installed at the pithead, enabling not only the wealthy, but the ordinary housewife to cook, clean, and heat by electricity. What is now being done to investigate the possibilities of tidal, atomic, or atmospheric energy? Yet we know that inventions are to come in the system of change which is life, that will outclass radio and make a mockery of our automobiles and electric lights with twelve or two per cent. efficiency from the hard won fuel.

Scientists have become tired of warning the country of the results of using coal recklessly. Millions of tons of valuable chemicals have been thrown into dust bins or allowed to escape into the air. Low temperature carbonisation would have almost enabled the country to have free light and power, the oils and chemicals resulting from the treatment of the coal paying the cost of mining. We are making great steps in this direction now, but the cost is far greater than would have been the case thirty years ago. The result is that while comparatively poor German coal fields are making

handsome profits, our own cannot afford to pay wages that are even honest.

How many scientists have been honoured—if it is an honour—by a seat in the House of Lords? The number, compared with the wholesale meat merchants, brewers, newspaper owners and successful generals, is ridiculously small. Scientists do not care about honours and money; they may not usually seek the limelight, but they have vital knowledge to give to the country and recognition of their value would be of immense encouragement, with ultimate benefit to the nation.

I am not suggesting that we should have more scientific members of the House of Commons. They would loathe to become ciphers labelled “Aye” or “No,” for they would realise that the whole matter of voting could be carried out more expeditiously, and with less waste of money, by machinery. Being unassuming men, they might be gagged by the knowledge that every question asked in the House, whether it serves a useful purpose or not, costs the nation many shillings. But I do suggest that every member should have at least the rudiments of science in his head so that a scientific, rather than a party, spirit, might be abroad in the House to the vast benefit of a long-suffering, heroic collection of taxpayers.

There are so many examples of successful despotism in business and in other countries that it is hard to comprehend the principles of a house which is invariably divided against itself. England represents virtually the only first-class power that retains a

Monarchy; it is a pity that so good a practice should lead to the decoration of streets and the creation of parasitical honours. Why not seize the advantages of this situation? It has been exploited in Italy to the benefit of everyone who does not object to that national selfishness we call patriotism.

Let us class together the wasted energy of the sounds emitted in the Houses of Parliament and the waste of money entailed by warfare. Civilised war is so much more stupid than that of olden days. I admit it is an encouragement to the inventor in his attempts to produce a death ray, bacteriological bombs, or some emanation which will sterilise the males of a preceding generation.

I will even grant that these developments would be advantageous during peace time in an over-populous country. But why not secure results scientifically? It is worse than the case of those who waste money on whisky when drugs are more effective, or who encourage unwanted nations to be kept in a nursery by other powers, far better suited to employ their lands and money.

War produces women who make munitions at expensive salaries, and write to the papers in the evening in complaint against the bombing of innocent females. Politicians see no joke in the making of laws by empty benches while their opponents are too tired to speak. It is war that collects clergymen in red cloaks and motorcars, to bless a long distance cannon in the name of Jesus Christ.

CHAPTER VI

CRIME AND IMPRISONMENT

IT IS ONLY in recent years that the detection and punishment of criminals has come to be regarded as a matter of science. Since the dawn of civilisation or recognition of "right" and "wrong" those who did "right" have been puzzled to know what to do with those who did "wrong." Comparatively primitive races settled the matter easily by ordering the death of all who offended, and the criminals themselves were often agreeable because they welcomed the future life. But to-day the problem is not so simple. The opinion of civilisation is definitely against the taking of another man's life, even in the name of the law, and many believe also that the proper fulfilment of this life is important to the enjoyment of the next. Incidentally, a very selfish outlook, reminiscent of the commandment which orders good behaviour that thy days may be long, in other people's land!

The tendency to-day is to regard the criminal as a patient requiring expert treatment. It is argued, of course, that there is a certain type of criminal who was born to crime, will continue to break the laws of civilisation until he dies, and that the only punishment for such a man is imprisonment or, some would say, death. But this is merely to beg

the question. What is it that causes the person concerned to act in this fashion?

Curiously enough, many of the most enthusiastic supporters of imprisonment and execution are followers of formal religions which are built on the belief in a God of alleged goodness and love. The scientist, who may or may not, believe in any dogma, argues more logically. He considers that all men are not necessarily "born good," because he understands the working of heredity, but he believes that if they break the moral code propounded by their fellow creatures, it is because their bodies or their minds are abnormally developed.

The thyroid gland, for example, which has a profound influence on the body and mind of a man, is usually developed to a certain definite extent. If any otherwise normal person suffers from over or under secretion by this gland, the chances are that as a result of this abnormality he will have a manner of thinking which will cause him to commit "criminal" acts. His sin against society is that he is not as other men. If the large majority had under developed thyroid, then those with what we now call moral sense, who refused to steal or murder, might be considered insane and even criminal!

The definition of right and wrong has varied tremendously even in the very short history of civilisation. The crimes of the 18th century are now regarded as mere failings, while the social customs of to-day might be found disgusting and criminal by a tribe of savages. Since change is the only certain fact of this world, it is more than probable that the

moral code of to-morrow will shock many people living to-day. It is interesting to realise that if a British sailor were to be wrecked on an unknown island inhabited by one-legged men he would be regarded as a monstrosity and probably exhibited at circuses! Sailors of other countries probably wear glasses by now, so that our own navy can hardly be considered as the sole example of logic.

As long as we are content to think in terms of "punishment," we shall never be rid of criminals. Four thousand years of flogging, torturing, killing, and confinement have failed to rid us of crime, for the simple fact is that imprisonment merely indicates that we have no idea what else could be done with these peculiar people. Man who has been to immense trouble to tame wild animals—for the cow, the dog and the cat were all originally savage—cannot be bothered to tame his fellow creatures.

A few workers are investigating the problems of crime, upon scientific lines. The first step must be to find the cause. Sociologists will tell you that crime is due to bad housing conditions, poverty and unemployment, but this does not explain why every slum dweller is not a criminal or why stockbrokers appear at the Old Bailey. The cause probably lies far deeper. These may be some of the conditions which help to turn the potential criminal into a hardened "lag," but they are not the cause.

The work of medical officers in prisons has led to the conclusion that a large proportion of crime, especially by professional criminals, is due to self-development of one or more parts of the body.

Abnormality of the gonads, for example, is found in almost every pervert and sexual criminal. The thyroid may account for crimes of violence, while inefficient working of the pituitary is found in many pickpockets, petty embezzlers, fraudulent promoters and similar criminals. Glands have been very busy since the Great War. Perhaps it would be more safe to refer to this conflict by date, developments are rapid in this century.

There has not yet been sufficient time to prove that criminal tendencies are due to these glands alone, although it has definitely been found that "hardened" criminals, in a large number of cases, are suffering from over or under development. It has also been discovered that by surgical operation or injection it is possible to restore these glands to a normal condition and that the "criminal" has frequently become a more normal, if less interesting citizen.

Surely this is a more reasonable approach to the problem of crime and punishment than that which presupposes certain men to be essentially "wicked!" Careful investigation of these conclusions and a certain amount of experiment should result in large numbers of criminals being turned into useful men. More important still, the children of criminals could be watched from an early age for the development of abnormalities which might be corrected in good time.

I am not sentimental about crime. The sentimentality of many penal reformers merely results in making criminals. A certain type of man with

an undeveloped intellect, for instance, will frequently choose a comfortable prison in preference to a day's work. To put a first offender on probation is in many cases merely to postpone the evil day. If that offender is suffering from some affection of the body which warps his mind, he will surely commit another offence. Far better to order that the prisoner shall be examined by an expert and given such treatment as may be prescribed. The law court of the future will not condemn criminals to the cat, knowing that violence is no correction of violence. It will realise that the man who knocks down a woman to take her handbag containing a few shillings is as ill as the man who is in a fever delirium. The court will prescribe treatment accordingly and with, no doubt, the same degree of justice as that which now imprisons young men for stealing apples. I believe sympathy will be less rare in the future, we are still very savage.

The problem of capital punishment is even more vexed. The mere mention of hanging is likely to provoke heated controversy. "An eye for an eye" we are told on the one hand, and "executing the criminal won't bring the murdered man back to life" we are told on the other. Parsons who attend an execution forget that "He gave unto them a new Law."

The only scientific criterion is really the question "Does mankind as a whole benefit by the death of the criminal?" It is difficult to find satisfactory reasons for giving a positive answer. I do not believe that the majority of men and women derive any satisfaction from learning of the execution of a

murderer—usually their sympathy is, for purely atavistic reasons, with the sufferer. They know that death is not “instantaneous,” that a civilised man can suffer terrible agonies during the period of waiting and even during the fraction of a second required to put him to death. They know, further, that death does not end the matter—that if there is a future life they have merely changed the responsibility on to the shoulders of another.

Just as it is better to teach an elephant how to use its strength for the benefit of man, so it is better to cure the murderer than to wash your hands of him and by a crude device of engineering to cast away the result of thousands of years of evolution. I cannot conceive of anyone with a knowledge of the marvels of the body and the beauty of its working, desiring to rob it of the vital spark which we call life to cloak the dignified ignorance of its reality.

Whatever science may teach about the punishment of crime it will always emphasise the necessity of its rapid and certain detection. Criminals have been far quicker to realise the potentialities of science than detectives. There are to-day a hundred devices to make detection scientific and certain, which a

neglected, while the criminal, realising that speed was one of the essentials of successful crime, brought the motorcar into his service long before the police. Even to-day the cars of the so-called “bandits” are often much faster and more suitable than those of the police.

Once it is realised that the detection of crime is an affair of science, it will become almost automatic.

I am not referring to the use of ultra-violet light for the inspection of cheques and jewellery or to medico-legal matters such as the examination of bloodstains and dust under the microscope, although this is important, but to the installation of such devices as the infra-red ray circuit. These rays are invisible to the naked eye, but with the aid of a selenium cell it is not hard to construct a device so that any intruder unwittingly breaks a circuit and rings a bell in the nearest police station. Or again, a safe can be incorporated in a tuned circuit so that the approach of anything solid results in a "capacity howl" being set up.

In both these cases there is, of course, a "reply." The criminal might well invent an apparatus to neutralise the circuit or detect the rays, and it would then be for the police to improve their "selectivity." Science cannot help creating new weapons for the criminal and it is essential that detection should keep pace. Even the spoons you hide in the wainscoting can be located by radio. Telepathy, hypnotism, sterilising drugs or rays, and bacteriological poisons, offer tremendous opportunities to the wrong-doer. The detective must answer by using physical apparatus to test the truth of statements, drugs to make witnesses tell the truth and similar devices. It has been reported that a form of scopolamine has already been used to make suspected criminals deal in fact alone. This drug, embarrassingly employed in "twilight sleep" has the power of obliterating the thoughts of a second before, like carbon monoxide under certain cond.

Pain is deadened because the action is to cause the patient to forget the agony of the previous moment; it renders the telling of untruths difficult if not impossible.

Again, it is possible to record the heart and pulse beats of a witness on a graph and to see the effect of certain questions or accusations. One form of apparatus that has been used experimentally depends upon the fact that during moments of nervous tension the body gives off imperceptible quantities of moisture. If the skin is made part of an electrical circuit, an increase in the amount of moisture results in "galvanic" changes which can be shown by a pointer on a dial. A man may be suspected of murder by stabbing. He is connected with the circuit and a conversation is carried on behind his back. To comments on the weather, the pointer on the dial may swing normally, but if somebody suddenly asks for a knife, it is not improbable that the pointer would jump with violence, indicating that the word "knife" produced some special associations.

I do not suggest that these psycho-physical tests would be accepted in law, we have not yet reached the stage when dictaphones are permissible in evidence and considerable research is still necessary.

But I would point out that although these principles were well known to the ancients, we have made little progress. The old "trial by ordeal" depended upon psycho-physiological tests. When a suspected criminal was given a handful of dry rice in the belief that if he lied he would choke there was a basis of

truth in the "superstition." Nervous tension results in the inaction of the salivary glands, and as a natural result the rice would have a choking effect. We have considerably neglected opportunities of experimenting with the possibilities of telepathy and hypnotism in the investigation of crime, and it is certain that the criminal will discover that auto-suggestion is a powerful weapon, long before the police.

It is only after many years of point duty policemen that the authorities have been persuaded to adopt automatic control at cross roads. Even now it is used in a comparatively small number of places. When it is realised that the more mechanical tasks are best performed by machinery, presumably intelligent men will be released for duties which cannot, as yet, be performed without direct human intervention.

Our greatest hope lies in education which would make the necessity for policemen and detectives a thing of the past. The sight of a constable on his beat should remind a man who flatters himself upon his civilisation, that he has advanced but little from the naked savage. Education will not only ensure that every man and woman has interesting work but also prove that crime is stupid, ill paid, and horribly unscientific in its results. There will be few, who, free from physical defects, cannot be persuaded into right living by the study of science.

Abnormality is simple; to be unnatural is hardly within the scope of human intellect. It is natural for the worst audience in the world to cheer the curlew

headed hero and hiss the villain. Pickpockets, drunkards and other fools do not pause to think that a small black moustache is ill fitted for its original purpose of filtering fish from streams. They say "the villain." What an argument for Sunday afternoon!

CHAPTER VII

AMUSEMENT

THE INCREASING amount of ordered leisure available to mankind, and unfortunately to "womenkind" as the result of inventions produced during the last century, renders the matter of amusement of great importance. The savage does not worry about amusing himself. He must spend many hours a day to ensure a plentiful supply of food and the protection of his home. He very wisely indulges in pastimes that enable him to perform these tasks more effectively. Savage dancing is a definite physical exercise calculated to build up physical strength, while most primitive games originate in training for warfare.

In spite of our education and many other advantages, we are not so wise. We have more time to spare than the savage and less need to train for battle. Yet we play childish games that might help us in the use of bow and arrow, and our dancing does not even develop the body to ensure that good digestion which is at present an atavistic necessity to the full cultivation of the mind.

Scientists are beginning to give some small attention to sport, and their influence will undoubtedly be beneficial. They are reducing the element of chance in most games and making the mind play a greater

and the body a lesser, part. Golf is one pathetic example. Originally played with crude clubs and balls, no scientific methods of manufacture were applied and the balls could not be relied upon to give a uniform response. Now the finest tools are used in turning or casting a club, X-rays make it possible to examine the interior of the golf ball and chemical fertilisers and insecticides ensure that a bad patch of grass or a wormcast does not cost the player a stroke. Even the cinematograph has been brought to the aid of so-called sportsmen and it is possible to learn nearly any game from the positions of a master, shown in slow motion.

It is curious that while players are anxious to do everything possible to eliminate the element of chance in sport and to make less demand upon their physical strength, they will not carry the business to its logical conclusion. If the object of deer stalking is to kill the animal with a maximum of excitement, why not use a machine gun and greased boots? Why catch fish with lines too fine for the purpose? In this mechanical age the use of an oar to propel a boat is very antiquated. Scientists are called upon to design vessels with perfect streamlining, to discover the best point of leverage and a score of other matters relating to mechanics and dynamics. Yet they are not allowed to suggest that the power of the oarsman's muscles could be more economically used in working a propeller or paddle-wheel!

The only excuse for sport is when it has utility, either in providing new material for commercial processes or in building up the intellect of the sports-

man. The scientific games of the future will undoubtedly be devised to satisfy both these needs. At present the only sports that may be called technical are motor-racing, flying- and motor-boat racing. The experience gained in motor-cycle and car competitions has made the cheap and efficient vehicles of to-day possible.

Many improvements used in racing to increase speed ultimately become incorporated in the standard design—overhead valves, super-charging and four-wheeled brakes are all examples of this phase. In motor-boat racing the knowledge gained of mechanical action of propellers and of the effects of streamlining is used by the designers of Atlantic liners. Flying, the one great hope for an island country too proud to tunnel, owes not a little to competitions and record attempts on land or sea.

These sports are scientifically sound because they cause people to think and because they are of practical utility. Neither of these advantages render them one whit less enjoyable. The motorcar designer is always planning to obtain another five miles an hour from his machine, while the air pilot experiments with various devices to lessen wind resistance and to increase reliability and speed. The principle of streamlining has been developed almost entirely by racing.

Further, scientific sports have this advantage that they are an excellent advertisement. I do not suppose that Australia winning a test match adds five pounds to the wealth of that Dominion. A few players might be tempted to buy bats from the same maker that supplied the winners, but that is all. The fact that

America holds boxing championships gives her no kudos, and Britain's failure to produce heavyweight champions seems to indicate that we are emerging more quickly from the savage state than other nations. After all, it would be possible to train a gorilla to knock out any man living; is it so wonderful to be able to emulate the apes? It can be left to women to improve their bodies. Men are busy designing the machines which the stolid stupidity of the average female enables her to use without fear.

The conditions of scientific sport are different. The winning of the Schneider Trophy Race has been worth a large sum to the aviation industry, and such feats as Hinkler's flight to Australia or the tour of the Supermarine Flying Boats resulted in immediate building orders from other countries. Records are good publicity for a nation's motor and aviation industries.

Scientific pastimes in the future will be developed along businesslike lines. Perhaps some genius will give us a game which combines all these qualities and is yet sufficiently inexpensive to appeal to the ordinary man. Certainly such barbarities as prize-fighting, stag-hunting, coursing and grouse shooting will disappear. They are not sport. If boxing appealed because of its skill it would be simple to have a system of registering the number of taps received by a contestant and belts which guarded a blow to the stomach. The truth is that we are still so savage that we like to see the triumph of matter, a fist inside a glove, over mind. Stag-hunting is merely a relic of barbarism and the

"bleeding" of young girls on the hunting field a revolting spectacle only made worse when boys are substituted. Equally horrible is chasing and listening to the screams of a hare.

The problem of amusement for the next generation is extremely important. At present sport plays an absurd part in the affairs of the nation. Our hospitals have to beg for money, while soldiers and other professional sportsmen are given handsome annuities! The discoverer of a cure for consumption might or might not be rewarded for his work by a gift of £100, but a man who can produce temporary unconsciousness in another, can receive £20,000 for three minutes' "work." No wonder he takes any insult lying down!

The great public have yet to appreciate the meaning of sport. It is a relative term implying change from normal occupation; it is not satisfied by the individual who kicks a referee or wastes substance on idiotic horses which exist on paper. Neither does the peculiar type of half-educated oaf who worships his body and watches a "glove fight" in a state of alcoholic truculence, in any way add to the good of the world.

We know that physical strength does not last, we hope mind value is more permanent in its influence. Can any honest person believe that it is reasonable to read in a newspaper of this century that "following a left to the stomach he suffered from violent vomiting!!" So "sporting" are the patrons of this business that police are drafted to the scenes of their revelry in large quantities!

Some laugh at cockfighting as degraded, and comment upon the disembowelling of horses at a bull-fight. They will listen to the screams of a hare, shoot tame pigeons, cut the throat of a deer and spend enough upon a horse to rebuild a town of slums.

Sportsmen have much in common. International teams usually quarrel, there is mostly an aftermath of bodily excess and all classes unite in an intense effort to avoid amateur rules for financial gain.

It seems clear that unless we can develop a sense of proportion, the outlook for our own nation is gloomy indeed. It is difficult to forget that Rome worshipped gladiators, hunted Christians, and plunged Europe into darkness for nearly a thousand years. I am not suggesting that there is any possibility of a return to savagery—1,000 years is a very short period in geological time—but I do think that the slavery of sport resulting from a release from slavery by machinery, is a definite menace to progress.

Rhythm will play an important part in the amusements of the future. The deeper we delve into the secrets of Nature, the more important becomes rhythm, for the whole human body functions rhythmically. I would go further and suggest that a sense of time was born when our protoplasmic ancestors lay on the beach and waited for the tide to rise at regular intervals so that they could feed. We even find a rhythm in worms and in so-called "inanimate matter" so that the oscillation capacity of a crystal is of great use to the scientist in measuring minute wave lengths.

Dancing is, indeed, an almost universal pastime

some form. It is not confined to niggers. The artist knows that the whole universe "dances," and the poet says, "to the music of the spheres." Man is developing a greater sensitivity towards rhythm, and it is possible that when we discover the real workings of the brain we shall find that rhythm controls its entire operation. I do not suggest that dancing will disappear. I believe that it will become more subtle and more useful. Dancing as it is practised in the modern ballroom is merely a concession to the physical disability exemplified by the waltzing mouse. It is largely the result of wartime hysteria, for most women are profoundly influenced by music, lights and supplementary refreshments. Young women suffer dangerous hysteria at these periods; rhythmic excitation must assist the birth rate to a noticeable degree.

The loose music of modern dancing will inevitably pass and we may find it necessary to receive additional stimulus. Even now few people could perform the tango in a warehouse. Glittering mirrors, lights and food all play their part in producing the effects of imitation happiness. In the future we may need injections, revolving floors and other aids before the will can be persuaded to counteract our sense of the ridiculous. Modern dancing demands massage of the mind as well as of the muscles. It is possible that, ultimately, we may dispense with the use of the body as an intermediary and that sensation may be broadcast to jelly-like individuals with atrophied legs will be even more repulsive than those so lavishly displayed in modern railways.

It is strange that Governments pay so little attention to sport and amusements. While there are laws to govern every aspect of work, there are none to control play. You must not work for more than an eight-hour day, yet you may loaf for sixteen! This distinction between work and play is most artificial and purely arbitrary for it depends entirely upon the attitude of the individual. The professional footballer kicks a ball about for labour; the schoolboy does the same and calls it play. There is no reason whatever, provided the right spirit is present, why work should not be play. The distinction is very unfortunate, so let us say that "work is doing something we do not want to do in someone else's time."

Change is essential. But if work—in its finest sense—is the most important thing in life, why not play for sport and develop this principle upon useful lines? The correct game for any intellectual worker is not only one which occupies his mind but which also stimulates the brain to novel activity.

The reading of novels to pass the time is scientifically unsound. Time requires no aid for we are its function. It is strange that Governments forbid the sale of pornographic literature but allow the sale of novels by shops with the half open door. Amusements should not dull the mind into insensibility. If rest is required, sleep is the best and most obvious remedy and it can be obtained by thinking of sleepiness rather than its effect. No one can define the moment of sleep and to imagine the impossible is irritating in the extreme.

No amusement should waste one moment. Time is our one example of democratic capital since the richest man cannot buy one minute or the poorest sell an hour. The study of science must impress time upon the mind, for three score years and ten is very little in the history of the world. One fiftieth of a second is quite an appreciable fraction of our life.

From this aspect of existence it is evident that art in any form is of definite amusement value; if somewhat futuristic in its application. It is instructive, therefore, to observe that although scientists are usually despised by artists as material specimens, more than a little is owed by art to the work of the engineer and chemist. The sculptor would be in difficulties without tools designed and made by scientists, the painter relies upon exquisitely prepared pigments, and but for the printing press, with all its developments, literature would still be the prerogative of the wealthy few. Photography has opened up entirely new possibilities in art. Music has been lifted, by the scientist, from the realms of tom-toms and rattling stones. Broadcasting has accomplished more for the dissemination of music in three years than have so-called natural methods in three centuries.

Another peculiar pose of the aesthetic amusement fanatic, is that of the collector of the antique. Unfortunately it has become serious in its effects, for it is resulting in the building of "century" cottages and breeding a dislike for progress comparable to that engendered by a constant application to Greek v.

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majority be deprived of the uses of revolvers, morphia, and cocaine, because a few fools do not appreciate their proper employment? Certainly not! These articles should be available to all in a free country. America introduced prohibition to increase her steel output and to save expenditure on alcoholic propaganda.

Modern art is not born out of sex appeal by young men in love. It should never need the subsidy of a pretty room or a good dinner. Neither, I hope is it necessarily a mode of expression for those who have nothing to express.

SPIRITUALISM AND PSYCHIC PHENOMENA

NO SUBJECT is so calculated to excite heated discussion as that of "spiritualistic phenomena." It is a religion with its devotees and terribly reminiscent of the schoolgirl's definition of faith. Although we can discuss the possibilities of relativity or even evolution in a scientific and inquiring manner, a similar approach to the very important problem of spiritualism seems impossible. It is difficult to obtain scientific opinions of fact when discussions upon the subject are carried on in the fashion of a séance; partial darkness with all the conditions of hysteria and auto-hypnosis.

It is unfortunate that no religious body has attempted to investigate the problem of so-called psychic phenomena for it might establish or disprove the many mysteries and theatrical conclusions which are alleged by interested parties.

Spiritualists are apt to forget that, those less credulous, or less fortunate, as the case may be, should be welcomed into their fold. It must be delightful to be certain of one's continued existence in realms which are at least, peaceful. But it is useless to treat such things as telekinetic phenomena as appurtenances to a religion.

A religion usually postulates that part of its is that it should be believed. It is pure faith w

that we must approach their fastness with humility lest some ectoplasmic manifestation be irritated by an antagonistic atmosphere. They forget that the prejudice which condemned Algebra as the language of the devil is not identical with the spirit of doubt which taught us that the world is round, or egg-shaped.

Allow me to quote the statements, as I understand them, of the more scientific spiritualists. "All matter is indestructible," they say.

"When a match is burned, nothing is lost, all the original materials can be collected even though their physical form differs from their original state." To this I am partly agreeable, I realise that a change of state is a definition of life and that a diamond is no more carbon than charcoal.

I realise that thought seems to be electrical in its inception and that it must give rise to some aetherial motion. I can understand that life extends beyond our immediate ken or even that if matter is the result of the accentuated motion of particles of electronic material, like heat or light, then the speed or nature of this movement may divide mind and matter. A clear opportunity for moving mountains or transferring raspberry jam from one side of the Atlantic to the other, by faith alone.

This would be a delightful conclusion, it may be true, but it is not supported by any test or result which can be repeated in psychic research.

Spiritualists believe that spirits are not thought forms which may well replace life as we know it, on some planets. They deny that memory has been inherited in cell form like a Roman nose or that

telepathic communication from living creatures can produce the facts of a materialisation. We are definitely asked to credit that the mediumistic voice is produced by some oscillation-borne entity which often chooses the world-form of a North American Indian. This also accounts for the cockney accent of Caesar when his medium greets Stratford as Shakespeare's birthplace.

I dislike all the unfounded assumptions for one main reason. The ghost enthusiast entirely neglects the element of time, so all-important to human beings. It is easy to deceive the mind in matters of relativity. An anaesthetic may easily give us the impression of a lifetime in a few minutes, while a dream can take the brain backwards to create a year of the future. Drugs can produce many curious effects of time and a drowning man is said to see years of his life pass before his eyes in less than a few seconds. Is it possible that genuine "mediums" who really see what they describe, are thinking across time, in much the same way as those who appear to have telepathic communication can see across space?

It is more simple to imagine that a condition of mental irregularity is produced by effort and that they are sufferers from the truth which has its foundation in belief alone. If I make a saturated solution of Glauber Salts and throw in a crystal, the whole liquid sets into a solid mass. Now there might be many explanations of this phenomenon. I might say that the solid had been mysteriously transferred from a suitable bottle or that I had

How in the wide immense do we know if time is similar in death? It is most unlikely. Do children grow up? Do we know the moment of death? Do animals live for ever? Certainly this must be the case if it applies to mankind.

The head of a dog has been made to eat after severance from the body, was it alive? To no one does this question apply more keenly than to the religionist. He is faced with an awkward situation. Death is followed by life! How does this life depend upon the pre-change period. By goodness of behaviour? Obviously it is Christianity in a dull form that prevents suicides in droves.

Is it not obvious that the methods of physical investigation must be applied to psychic claims? It is the effect of the mind at a distance by some yet unknown medium that should be the beginning of genuine experiment as opposed to hopeful trust. Why should we evolve ingenious theories which fit any number of chosen facts when one grain of truth would fill the Albert Hall, double every parson's salary and flood the Chancellor with conscience money?

At the many séances at which I have attended I have seen no attempt to standardise the conditions—an essential point if the experiments are to be convincing. It is difficult therefore to apply scientific tests when partial telepathy, hypnotism, hysteria and even mechanical apparatus can produce not dissimilar phenomena. By using a hidden lantern, barium oxide dust, and "invisible" rays I have produced "spirits" at a séance and convinced intelligent

people. I do not suggest that this establishes the fraudulent nature of every séance, indeed I neglect such cases altogether, but I feel that while there is a simple mechanical explanation it is vital that it should be considered before any conclusion is reached.

Spiritualism is not for discussion, but for examination. If it is genuine, the greatest argument that its supporters could use would be to give every séance openly; I fully admit that there may be a necessity for a few queer conditions, the atom was not discovered with a foot rule, but there must be no music, sweet perfumes, or other sex influences which so numb the action of the brain.

No one can feel capable of careful observation, any conjurer will explain how difficult this can be, after an orgy of prayer. Spiritualism may differ from all other methods of aetherial disturbance but it must not be connected with serious investigation if it is to be accepted, like Einstein, because it is under a halo of respectful wonderment. Other arts have suffered before from the attentions of the Faithful.

It is more important that we should discover the paths of energy from root potatoes to the brain and from it to the feeling of irritation we can inspire in our enemies, if any improvement is to be made in religious belief which can be offered to an educated public. They are tired of the God and fear complex. The love basis seems too good to be true.

No real advance can be made in the examination of psychic phenomena under present conditions, for

spiritualism is now the only branch of science in which fraud offers a golden harvest to the apostle. It is better than poisoning in the time of the Borgias and requires far less time for its practice.

Telepathy offers, I believe, great possibilities, although our brains so closely resemble those of a dog that little success can yet be expected. Experiments will show how best we may accomplish the ideal of communication without the intervention of wires or the use of the singularly clumsy mechanical device of larynx, lips, tongue and wind. Speech is a very slow method of conveying thought, writing is worse in days when time is becoming more valuable.

The discovery of the secret of direct transmission between mind and mind would be of inestimable benefit although it might be accompanied by prosecutions for "thinking" to the common danger, and render lead more suitable than honeycomb asbestos in the interests of peace when mechanical devices were needed for the first experiments. American scientists claim to have shown that thought can be mechanically measured but scientific research is hampered by prejudice and emotion when any ordinary telepathic trials are carried out.

The danger of psychological preference to the occult rather than the obvious explanation of any phenomena cannot be exaggerated. The Aurora Borealis may have impressed itself on savage minds as the work of unknown powers. To-day we accept a natural explanation without disputing the truth of that early finding. So with "seeing into the future." We take up a newly-published novel to find that the

words of some character are familiar. "I have read this book before" we say "and since it is only published to-day I must have seen into the future!" It is poor compliment to the mechanism of memory upon which civilisation is so dependent.

It has been shown by J. W. Dunne in his "Experiment with Time" that the past, present and future may easily be confused in dreams and that many people appear to see the future in this manner. But there is quite an ordinary explanation for the man who thinks he has solved this miracle. A thousandth of a second is a long time for the brain. If we could cease to think for this period, it might compare with twenty-four hours and it is quite possible that the sub-conscious mind sometimes experiences a "gap" in communicating with the conscious mind, acting on the senses and thus accounting for many cases of "pre-vision." The sentence which is believed to have been seen a week or even one year ago, may only just have flashed before his eyes. But the "gap" supplies the period and his conclusion is no longer relatively accurate, other than as another wonderful example of psychic casuistry.

Psychic science must become a rational explanation of natural phenomena. Too many people view the "occult" as a preliminary to a Christmas story. The remainder see no connection between mass suggestion and prayer, spiritual healing and a physical attack by mind on matter.

I believe that misdirected faith at too early a stage of what may be the most important discovery of man is helping no one but the nerve specialist.

Christian Scientists believe that disease is imaginary, that faith can cure. I also think that a perfect brain could accomplish "miracles" in that we could find no explanation. But I know that we are all so many centuries from this state that the greatest mind, with all progress and with every new weapon that is within our grasp, is terribly comparable to that of the red-bottomed monkey.

Of course we are improving. The ancients deceive the ignorant with the help of time. A modern schoolboy would have kept them in a state of terror and anxiety. The truth is easy to find when simple and all fact is easy to understand; it is so uncommon. Spiritualism is gaining from persecution, would that examination was equally full of encouragement. Healing by mental influence seems to compare poorly with the invocation of native spirits to remove an attack of influenza. Even the survival of personality is more probable than improbable in view of the energy emitted by the mind, and of its undoubted indestructibility. It is only the spiritualist who could so neglect the factor of infinite time or of the cycle of curved space as to imagine that such hopes can be encouraged by objective bodies which have been recently destroyed. If we argue that death is a function of time it is alarming to realise that, as seen by those dwelling in the stars, Antony and Cleopatra are still living, and obviously behaving in the best fashion of Hollywood.

Many people think that the objects around them are upside down. They may be right but the standard is here supplied by the conscious majority.

CHAPTER IX

WOMEN AND SEX

IN NO DIRECTION have the effects of modern science been more profound than on the status of women. The menial work necessary for the existence of human beings has always been carried out and must always be completed by slaves. Two thousand years ago it was performed by men and women who were freely bought and sold like cattle. One hundred years ago it was the work of men and women, chiefly women, who did not answer to the name of slave, but who were for all practical purposes little different from the bond people of ancient times. Women were the slaves of the kitchen. Their time was occupied in performing a multitude of tasks in order that their husbands might be free to think.

The invention of labour-saving devices has altered many of these strange conditions. It is often claimed that men have prevented women from gaining educational benefits by virtue of their great strength. An amusing suggestion, for elephants are stronger than men. Greater power may have secured better nourishment to the benefit of the male who has thus been able to increase his mental capacity with less risk.

The very chivalry of man has bridged the gap in cerebral values until it is now possible for women

to compete with their instructors, in a few very isolated instances. To-day women probably suffer less from "work" than the majority of men. The modern house, equipped with electric fires, electric ovens, electric light, and electric vacuum cleaners requires comparatively little attention. Chilled and tinned food, automatically-controlled cooking, with a host of other developments conceived by men, make housekeeping a very different task and have combined to release an untamed force upon the world.

The result of "this freedom" has been that women have the opportunity to think. The fact may follow! It is obvious that as long as human beings are occupied in searching for their daily bread there can be little time for intellectual development. If it was necessary for me to prepare my own breakfast in the morning, light a coal fire and heat water, or if I had to walk five miles to my task instead of taking a train, I should probably be less capable of work than under the circumstances of cars, comforts, warmth, and newspapers.

Women have failed to develop for many centuries partly because of the physical handicaps of their sex, and partly because they were content to enslave their minds for the sake of a home and security. This period is changing and after about one half century of education it is their own sex and not that of the male which proves so formidable. The majority are free, a most dangerous state for a community whose numbers are in themselves a confession of competitive inferiority. Women do not fill polytechnics

Like "Nachkultur," it may be excellent for those who already possess the moral stamina to do without mental discipline. For the rest, I might quote Caesar or Sitwell for once. *Si monumentum*——! One could be less classic and recollect the lady, who, learning that these things also applied to the poor, remarked, "It is *much* too good for them!"

Women are handicapped by their numbers. Because of the great risks incidental to males, women are always in the majority, and hence there must be keen competition to secure someone who is willing to support and cherish them in a stricter manner than would be implied by any legal or business agreement. Science has not yet been able so to proportion the sexes that control can be secured. This very largely accounts for the existence of fashionable magazines, the publication of photographs as advertisements and the prostitution of Empire Government to women who in no manner contribute to its immediate safety or defence.

The vast amount of time and energy wasted on clothes, cosmetics and lap-dogs has not yet been saved by the education which will eliminate much that is trivial in the character of women, while less frequent childbirth may result in their greater energy and mental capacity. Men do not discuss their wardrobes or use a dog as a stalking horse for tram-cars.

Many people are disgusted by the idea of children being scientifically fed and reared from birth, but this is the logical goal of women's endeavour. Education again, will show that it is foolish to ape

men, for men are, and must remain in a condition of mental and physical superiority for many years. Women can only obtain a position of equal importance if they are willing to develop along characteristic lines, and to make use of the gentle art of persuasion which saves the home, builds bridges, creates art and causes murder.

It is not a matter of importance to swim the Channel. Men have accomplished this feat with less recourse to photography, but the majority realise that a boat is more scientific and safe. To refuse to use modern inventions is to display that lack of intelligence which seems so emphasised by "sport."

Women are greatly handicapped by their sex. Men can indulge with less danger to themselves, whereas bio-chemistry shows that unfaithfulness in women has a more than moral effect. We are tolerant of "Mr. Brown-Robinson's" escapades in Paris or Prague but a similar performance by his wife will make every window curtain quiver as she walks down her own street. The laws of science cannot be altered by Parliament and equal rights in divorce cannot overcome the thwarting of nature. The chemical adulteration of a woman is perhaps more complete than that of a man and might not always be restricted to one generation.

In the past women have realised that sex mystery is their greatest weapon, and they have used it freely. To-day it is becoming a joke under the influence of education and the *Thé dansant*. The "doll woman" must go—in the words of a parliamentary correspondent.

The greatest lesson that science has for women is that for creative thought. Flying a male-made aeroplane proves nothing. All the tasks which are popularly supposed to be women's province are best performed by men. If we need good cooking, a chef; if we want fine dresses, a male designer and so on. Few women hold posts of importance, not because they lack opportunities, but simply because they have little creative ability or lasting courage. Male inventors outnumber the female; it is men who have invented our household labour-saving devices. A few women have won academic honours it is true, but an ability to pass an examination shows nothing except a certain parrot-like memory. As long as "Another woman's feat" is an evening paper placard, we can assume that women are still definitely inferior. At present the interest shown in them is of the same type as that given to a clever performing dog.

Sex and food are the animal kingdom. For all we know the "parts" of the nucleus of an atom may represent the effective equivalents of male and female. Mankind is more conscious of sex, and this consciousness has probably been the cause of most unhappiness as we know it to-day. Happiness is relative, we are cold because we have been hot. Sex is more stable than water which is only soft and liquid because of time.

We still know very little of sex. Biologists can explain many matters which previously seemed mysterious, but they cannot account for the difference in mentality between male and female. Nor can they

altogether explain the workings of heredity, a subject which will be all important in the scientifically controlled state of the future. At present the State offers a bounty to any mother; it will, in fact, pay for adding an epileptic child to the population of the country. In the future married couples may well be fined for bringing useless children into the world, while those who produce particularly useful members of the community will be rewarded.

We have now advanced beyond the stage when it was believed that childbearing was a duty. We have learnt that it is often an offence, and we are agreed that punishment should always be preventive and merciful. This is in accordance with birth control which definitely exists throughout the civilised globe, but X-rays and simple surgical sterilisation are still neglected in this respect.

I think a removal of the stigma which has for so long attached to the unmarried would relieve the situation. A woman is allowed to "tell" but never to choose. She is not trusted. A chaperon is vital to the very rich because the world cannot trust the woman or because the parties concerned cannot trust themselves.

Even the formula of marriage is a degradation to the woman in which bodily and possessive contact forms a background of smirks to a most poetic accompaniment. It resembles the custom still common in some countries where the bridegroom holds to the window an uncleanly proof of the chastity of his wife. This feature would not, perhaps, be practicable in a civilised land.

Such habits are valuable as an indication of our savagery and important to a Church which desires permanence. Husbands are reputed to be fond of comfort and food. This is most true but few women trouble to supply the interest which is so necessary. Stately acquiescence has wrecked many marriages, yet it is a compliment when the male discovers that the physical act is by no means the summit of his ambition.

It will be so sad, if woman sees fit to slacken in her endeavours to outstrip her mate. These associations are comparable with the R.S.P.C.C. and the Society for the Prevention of Cruelty to Animals with the difference that neither children nor cows have the advantage of parliamentary franchise.

The social position of women is extremely curious and can only be compared with that of a formal religion. Just as hundreds of men and women repeat hymns and prayers which they believe, but know to be useless or untrue, so men deceive themselves into relying upon the goodness and beauty of women. How often does a man refrain from speaking of some delicate subject because there are women within earshot? Yet everyone knows that when alone, women speak in far more frank and often in indecent, language of subjects neglected by the more sensitive and sentimental, male. Few men could do the work of a nurse without action to control the mind. They feel the agony of a scene with their mind rather than the instinctive pang of a mother in defence of her child. Yet women leave men after dinner and we have not the courage to acknowledge the obvious reason!

Men and women have to realise that the passing of a few laws cannot appreciably speed up a process of evolution which is an affair of aeons. You may take a dog, state that whatever it does is right, crown it King and give it worship. But by no known scientific or surgical process, as yet invented, can you increase the capacity and power of its brain. A dog can be taught to kill but not to create. Given the opportunity and segregated, it might well return to the habits of its wild forefathers. Women-kind are as young in the mass as they could desire in the individual. Guns are useful things. It is wrong to use them for suicide.

The brain of the human race is not very much advanced from that of the monkey. Women may rule the world and obtain complete power by a judicious use of numerical superiority and sex appeal, but at present they can do little more to increase the rate of advance of civilisation than they have in Parliament.

Every female is wholehearted in her acceptance of the instinct which makes the finding of a man so important. The tail of the peacock and the comb of the cock are all found in different forms in the female of the human race. Unfortunately the numbers of women render it impossible for them to be sure of marriage so that other forms of competition of the kind found only in animals have been adopted. They have yet to learn that sex urge can be applied to many other purposes than a husband or the encouragement of popular perversity. Specialisation is always dangerous in animals.

Crusty spinsters may have suffered from the megrims but man suffers more when his very existence is threatened at regular periods by a woman whose blood pressure can order her affections. I really believe that until we can combine the body of a wife's best friend with the brains of her bitterest enemy, peace will not come in our time. Until some principle of "animal" ectogenesis with pre-natal education follows the increasing practice of Caesarean birth, I do not comprehend how women can be subjected to the same intensive education which has schooled men to become stockbrokers.

Only the perfections of a few women can be held responsible for the lure to which every man bows the knee in the vain hope that his opportunity is good. One could have hoped that photographs of actresses in retirement would have remedied a passion for appearances which men have never survived. The male commonly claims that externals fail to interest him. This has as yet only reached the stage which recognises that pretty women have ugly children. That he is not blinded by a youthful urge. That, in short, his parents are fools and that no glands can dictate a course to his own overpowering mentality. This obviously is what every woman knows, she will discuss football, if suitable, or even horses, if attention to that intensely stupid animal is socially desirable, with the one object of which she is so essentially capable. Women and guns are dangerous. It is a mistake to forget a law of nature and shoot oneself.

Our Churches are filled with women whose reason for confession is that they have nothing to

confess; yet who is so quick to learn? The self-made man is proud of his fight, his wife in terror of his shortcomings. Such imitative genius is now applied to men. Very flattering, but of less value to the world than the encouragement which alone can give the happiness that is the object of all labour. Women are creatures, still, of change. They are too selfish to realise that this faculty might have a useful application in their dealings with men. Charity and vanity are closely allied.

They are drunk with power. They see nothing strange in borrowing their man's telephone to communicate with his friend. They are happy with the joy of a modern man suddenly transported to the holiday court of Cleopatra. Their philosophy is summed up by the reply of the man whose wife, treating him with ecstasy for one evening, remarked, "Are you sleepy?" "Yes," he said. . . . "But what would my wife say?"

CHAPTER X

FOOD AND DRINK

THE LAST twenty years have demonstrated the extraordinary scientific significance of food in human life. Until the beginning of the nineteenth century few people thought of food except in terms of "good" and "tasteless." Food was considered, sometimes unconsciously, more often consciously, as a necessity to make the bodily machinery function and as a means of gratifying certain hereditary desires. The realisation that brain and not body is the most important part of human well-being has brought about a complete change in thought as applied to nourishment.

The question now is, "What should I eat in order that I may think well?" Men and women are beginning to doubt the wisdom of over-loading their stomachs, because they know that the digestion of this food will draw energy from the brain. Whereas the city man of fifty years ago ate a meal that would have done justice to a savage; the brain worker of to-day is more abstemious and aims at feeding his mind rather than his carcase for which he has little service.

We have learned that the bodily functions are governed by minute quantities of chemicals, the existence of which was not suspected until recently.

The discovery of vitamins is probably only the prelude to the location of other chemicals in minute quantities in the body. It is suspected, now, that minute quantities of certain substances, such as iodine, play an important part in the working of the human machine. There is no doubt that food will undergo as many changes in the next few years as has been the case during the last century.

Many problems have to be faced. What, for instance, is the part played by the senses of smell and taste? It is said that a man working in a "condensed" beef factory has no desire whatsoever to eat, because of the smell. Children hate foods which they have been compelled to eat. An appetising smell can so affect the functions that the saliva flow is increased in anticipation. We all know that a meal which might cause acute indigestion, if eaten in solitude, is not noticed if taken in jovial company, or that foods we dislike are of little more service than would poison berries be to a bird. These and similar discoveries seem to point that the mind is almost as closely associated with the stomach as our pride would have us believe it to be separated.

A study of racial characteristics and diet, indicates that the mind is "made" by food. There may be some truth in the old song, "It's the Roast Beef of Old England. . . ." The characteristic German diet is as different from English food as is the German mind. It may well be a matter for the scientist of the future to decide what diet is calculated to develop the brain most effectively? From this it is easy to see that special professions will be prescribed.

special diets, and that parents will be able to give their children the proper food to prepare them for any particular vocation. A scientist already claims to have changed a typical Hindu into a typical Japanese by dieting.

Undoubtedly as the power of the brain develops, less attention will be paid to taste and smell, other than by mechanical amplification. The interruption of a train of thought by the smell of a beefsteak is merely a reminder that we are still little removed from savages. As man uses his body less and less, so his meals will grow smaller and more purposeful. Even to-day we could not face the loaded tables which were found at every meal five hundred years ago. We may ultimately come to the time when one good meal a day and a few chemical snacks will suffice for any man. It must be remembered that each year time becomes more important as we speed up our lives. I doubt if the world's supplies will always permit us to eat many ounces when a few grains of nourishment may be extracted. We do not want our bodies. That they must be healthy is no argument; even a dog will eat when its head is severed and attack a bone after half its stomach has been removed. This is habit; as powerful as that which operates our hearts, lungs and eyelids. The modern man can do twice as much in an hour as his ancestors and in the future he will probably learn to think in "split seconds." It is largely a matter of habit. The ordinary person cannot visualise one fifth of a second, but a professional time-keeper can do so, and to him it is an appreciable

period of time. A few hundred years ago business men made appointments to meet "when the moon was new." To-day we are more accurate and say, "3.15 on Wednesday next, I can give you three minutes." All this implies not only a saving in the time spent at table but also special foods. The man of 2031 will not be content to spend one-tenth of his life eating, he will think more quickly than the "native."

Food will trouble us less and less as time passes. It is perhaps unfortunate that the results of modern research into dietetics have been given so much publicity. Men who used to delight in telling of the pleasures they received from the table now count the vitamins in every mouthful, producing an introspective frame of mind. Dietetics are the study of the expert cook and should not worry the ordinary man unless he is seeking knowledge. It would be terrible for the average layman if he knew the symptoms of every illness under the sun, for a headache due to indigestion would convince him, like a medical student, that he was suffering from some deadly disease. Medical men have been trained to the subject more broadly and can examine these matters from a purely scientific point of view; always bearing in mind that life, hope and faith are excellently confused.

It is curious that modern science has produced nothing new to satisfy the senses of smell and taste. Tea, coffee, cocoa, tobacco, and alcohol have remained the popular drugs. There must be others which can give satisfaction in a new way and be no

more harmful after suitable immunisation. I suggest that a fortune awaits the technician who can find a substitute for tobacco, a substance that will sooth the nerves in the same manner without affecting the lungs or heart.

Drink is as difficult a subject to discuss as spiritualism. On the one hand we have the teetotalers, unfortunately largely composed of men and women with a passion for preventing others doing anything and on the other the "good fellows" who delight in seeing the brain rendered impotent by a drug. Statistics prove that the world is becoming more sober, and I believe that science will succeed in making the world what the Americans call "dry," where all the preachers and fanatics have failed.

Every year the brain is becoming more important in everyday life and drunkenness, therefore, a more serious matter. The man who became intoxicated two hundred years ago did little harm to anyone but himself and family. But to-day he may drive a car and run over innocent citizens, he may fire a revolver and do untold harm. I believe that machinery will force sobriety on mankind and that as the world is mechanised drunkenness will be regarded as a serious offence instead of a laughing matter for the most respectable cartoonists.

The fascination of drink, even to-day, is curious and I find it difficult to understand why doctors say that a little alcohol is good for man. It is perhaps true that some alcohol does no great harm, but it must be remembered that we are still comparable to the nigger. We legislate to prevent men carrying

firearms without a licence, not because firearms are dangerous in the right hands, but because they may be fatal in the hands of the mentally under-developed. Surely the same is true of alcohol? Any criminologist will confirm the fact that drunkenness and crime go hand in hand. Alcohol, like certain other drugs, dulls the mental faculties, produces an artificial hilarity and sense of well-being. Now I am anxious that everyone should be happy and have a sense of joy; but is this not achieved better by understanding than by drugging? The logical corollary to the free sale of alcohol is the free sale of any other drug that is not fatal in small quantities. If alcohol makes me feel happy, why should I not also be allowed to take small quantities of opium which produces much the same effects?

I discuss this point from a purely scientific point of view. I realise that the example of America will always be cast at me, but is it not true, since the fortunes made by the sale of alcohol are so great, that millions a year are spent in subversive publicity for drink? Sociologists must wait until the next generation has grown up in America to appreciate the effects of prohibition, though I am willing to admit that prohibition without education is useless.

In England we have very sensibly avoided prohibition because every thinking man and even the politician, knows that but for the false content created by alcohol, a revolution might arise which even broadcasting could not quell.

Most objectionable drinking comes from stupidity. Men and women think they are brilliant under-

excitation. They are disgusting in the same sense as those who over-cat. They are atavistic in their desire that the worst shall be concealed and childish when they argue that "sensible people can be trusted." Why bother with law and order if not for the foolish majority?

I do not stress the diseases spread by alcoholic excess, I indicate instead that petty crimes and the looseness of mental aspect which permits men to associate with stray persons of either sex, in a condition of "good cheer," mostly result from a very small drink.

The consequences of this temporary "uplift" are noticeable in our peerage; it is so hard to understand why we must not delight the sportsman by a doped horse when a doped man is a never-failing joke at any theatre. Add unfaithfulness to appreciate the stupidity of applause at its full.

Men do not lose their work by teetotalism, they obtain their alcohol by sugar and their pleasures are more sensitive in inception. Yet we are still pressed to "be friendly." What a poor compliment to our intelligence if our associates take offence upon refusal!

Are we, in England, *quite* certain that prohibition is a failure? Does "freedom" creep back to state after state? Is America losing industrial ground? I take it that no anti-prohibition propaganda has in any manner influenced our judgment?

Food and drink are important. They will almost outweigh every other consideration. We shall not bring them to their proper level for untold centuries,

when centralised kitchens, specific feeding, the supply of corrective foods to mothers and fathers and a stomach so reduced that tabloid meals are sufficient to cause its old-time workings to take place, have supplanted the worship of to-day.

We no longer need an appendix to deal with modern victuals. Is it not time we abolished some other part of our anatomy which is troublesome or invented an operation to satisfy the dictates of fashion?

I doubt if a meal in years to come will ever be taken without its proper accompaniment of sound, colour, injection or sex. A modern restaurant suggests that food should be taken during sleep and in sound-sight proof segregation. The emotion of one's fellow creatures, as displayed at meals is one of the most trying phases of life. It compares with the rustlings of large newspapers or the noise of "usual offices" in a quiet dwelling.

CHAPTER XI

CLOTHES

FEW PEOPLE may consider clothes to be a matter for scientific study; yet the very fact that covering our bodies takes up so much time and calls for so much discussion, indicates that the scientist can offer useful advice. At present we have the usual phenomena of conflicting medical recommendations which explain that clothes are the ruination of the body and that flannel belts should be used to surround the abdomen. Women lengthen their skirts and indicate their backs in such fashion that the words "Which end?" have now supplanted those of "How Long?"

At the moment we are far more concerned with fashion than fact. If it was competently stated that silk was the only healthy material for clothing, women would still wear satins and cottons, for the simple reason that they are only interested to obtain their comfort through the direct medium of man. To suggest that we wear clothes because the human body needs protection from the wet and cold is ridiculous. No modern dress affords adequate protection from the weather and we do not really dress from a sense of shame.

Apart from the need of satisfying the police men and women cover themselves for the same reason

that birds grow bright feathers, to attract the opposite sex. Very few of us are willing to learn the art of camouflage from insects or to admit that we are more interested in garments than thought. It may be that the scope is greater. The only real reason why women do not go naked is that they know this would render them far less attractive and that cold hairy legs, too short for a body, are very distressing against a natural background.

This history of clothes is of fascinating interest for it closely resembles that of the torture chamber. There are, without doubt, many people living to-day who owe their digestive inefficiency to a combination of stays and a vertical walking posture. Heads, waists, arms, neck, and feet have suffered agonies in times when face lifting was unknown. A woman's toes resemble a bundle of diseased bananas from the forcing of a stout bulging foot into the confines of a court shoe with little pieces of wood stuck loosely behind.

The waste alone of footwear is appalling, and though science has discovered little to prevent a leakage of raw material, in the back-to-nature rush, nothing is so bad as the loss of decency and credit which the female will suffer to accomplish abominability of dress. The morals of international credit and hire purchase are angelic by comparison.

We are willing to waste money on garments made worthless or uncomfortable by a passing shower. We use heel supports that increase the pressure on the material to a ludicrous extent. The world would wear human skin woven into "elephants breath" stockings if some self-seeking Parisian Asiatic held

stock enough to render advertising worth while. Of profits made no man dare write.

The absurdity of the suggestion that clothes are worn from a sense of modesty becomes apparent when we consider a few typical cases. If a woman in a tramcar or tube considers that a man is looking at her, what does she do? She pulls down her dress a little, to hide her knees if they are ugly, for women are still trying hard to create a leg complex which has become dangerous in the days of closed cars. But if an Arab woman passes a group of men she pulls up her skirt and flings it over her head, believing it is the face that must be concealed! Which of these two women is right? It is a matter of impure suggestion. Two centuries ago, an artificial blemish or beauty spot was worn to provide contrast. In modern law it has been held that the picture of a completely naked woman may be artistic, but that a naked woman wearing a wrist watch is poor craft.

Again I can appear in a bathing dress at the seaside with comparative immunity, but if I wear this costume in London I should probably find myself at a police station or a Bright Young Party. Surely if clothes are decent in one place, they are as respectable as curtains in another. It is amusing to observe how this idea of decency varies with climate and time. For a man to work stripped to the waist does not attract the attention of passers-by, but a woman in the same situation would be vulgar or gentle in accordance with her outline. Yet this creature can appear in the most fashionable drawing-room leaving no doubt about what was under her clothes,

as to the nature of her sex and looking as if that knowledge was a matter for disappointment.

The Victorian décolleté revealed a large amount of anatomy. We are so savage that we enjoyed it all. The ankles were concealed, so perhaps in the next generation baring of the right wrist will be considered immoral; this attitude would be quite as logical as that of the world to-day.

Is it not time that we really considered this question of clothes in a sane fashion? Time has become too valuable to be wasted to consider in what garb we shall think, it is the thought and not the dress which lasts longest. As it is, if I want to deliver a dreadful speech on an important subject, I have first to encase myself in the various bits and pieces, popularly called "evening dress," to show reverence to eat a beef-steak and render my mind as incapable of working as is possible.

Even History has shown that the more gaudy the uniform the less active the brain! Soldiers have always been famous for their attention to dress. Now, when it is known that red and gold are death-traps, the professional killers wear these absurd garments as soon as they leave the battlefield. Bear skins and leopard hide may have served a useful purpose in the days when they served to frighten the enemies, but to-day it requires something more substantial to produce this effect. The one remaining excuse for busbys is the "Come to Britain Movement."

Would it not be better to have visitors to discover our intentions instead of what we propose to wear. A fashion parade is no better than a circus.

Uniforms serve a useful purpose when employed to impress the uneducated. You have only to meet a police constable eating his dinner in shirt sleeves to realise the difference; how dignity can cloak ignorance. Some find it amusing to dress like Napoleon. No doubt it conceals something more objectionable and foolish. But modern men and women need not be disturbed by appearances. Gold braid, red tape, and fur hats should be relegated to museums in which the next generation will learn the lack of mental development of their ancestors and use these signs of extravagance as object lessons for children.

The nudists are equally unscientific. They say that man was meant to go naked and that he will only achieve the health of a savage by burning all his clothes. They suffer from the same disease of sentimentality as those who pretend that the 18th century represents the height of culture or that there really was a golden age some hundreds of years ago. If they believe that primitive man roaming the jungle without clothing was an ideal, they are welcome. But why stop at primitive man? Why not go back further, and proclaim that the missing link was an ideal, he was probably more naked and healthier than his cave brother. Logically there is no reason why we should not thus proclaim that our fishy ancestors lived the ideal existence.

"Yes, but these ancestors of the human race had no intelligence or brain power" they reply. True, and in the course of developing a mind, however small, man has had to forget his body. A 20th-

century mind is as ill matched to a 1st-century body, as an Elizabethan house is suited to modern sanitation and electric light. Explorers have reported that few, if any, savage tribes, walk naked; the object of the vast majority of savages is to acquire as much clothing as possible, to attract the opposite sex and to protect all that is important in his life. It is for this reason that I doubt the sincerity of the nudists and nut eaters when they give technical reasons for their peculiar creed. I feel it would be much better if they would admit boldly that they have a secret desire for skin acreage and a gland fed complex for sensation.

I look forward to the time when clothes will worry us not at all and hygienic two-piece suits of easily washed and sterilised material are universally worn. At the present moment men are careful to change their shirts at least once a week, but they will wear a coat for years. I venture to suggest that if I could show them that old coat under the microscope they would hesitate ever to put it on again. The same applies to our shoes. We carefully wash our hands at least once a day, and carry round dust, dirt and poisonous germs on the ends of our trousers and socks.

The man of the future will be far too busy to waste time draping himself in pieces of vegetable fibre and animal fur. The progress of women can be judged in direct proportion to their interest in clothing. As long as shop windows continue to attract crowds, and as long as women can be paid ten and twenty pounds a week for wearing clothes

which will ultimately be bought by withering ladies in a passion of hope, women cannot be considered seriously from an intellectual standpoint; And is it not curious, by the way, that men can stare at "intimate" garments in a window, crests to suit any regiment, which, if he were to regard when on a woman, would amount almost to indecent assault? A man looking in at the window of a woman's underclothing shop epitomises our idea of clothes as the most useful weapon in the armoury of sex.

I do consider that some steps should be taken to secure aesthetic satisfaction for the public. The countryside is protected by an excellent society, but no one restrains human beings from disfiguring the streets. I look forward with confidence to the time when beauty will be "attached" at birth and when we rise a little higher towards the ideal clothing than the baring of knees, necks, and hair to the unsanitary dust which alights upon the hats of ordinary mortals.

The last great war demonstrated the well-known tendency of the female to unclothe, no doubt a last attempt when males are reduced in numbers, but originality of conception in dress was lacking. Improved methods of travel must affect clothing as much as language, for aviation will make it essential to control both body temperature and overall appearance.

Control of dress like closed motor cars will probably govern morals, as defined by religion, and should help legally to proportion the birth rate to future economic conditions.

CHAPTER XII

INVENTION

INVENTION may be described as the science of consecutive thought. In the mind of the public the inventor is not generally considered a scientist, nor is invention one of the recognised arts. Yet inventors undoubtedly play the vital part in civilisation. But for their work the world would be primitive; it is invention which has made civilisation possible.

The popular conception of the inventor is only too often that of a man with a black hat, a fanatical expression, and a straw in his hair. His eccentricities are as proverbial as those of the artist. All this, as Euclid says, "is absurd," and very far removed from the facts. Great industrial concerns pay handsome salaries to inventors, and organisers are not in the habit of paying for eccentricity. It is because they know that the inventor is a scientist who has developed a special method of thought that modern business men value him as highly as a potential company.

Invention might almost be divided into three parts, first, there is the acquisition of knowledge. Unless an inventor knows what has already been accomplished in the field which he is entering, his labour is likely to be wasted. Many amateur inventors have their hopes dashed to the ground on a first attempt to complete a patent. The idea over

me the use to which it may be put?" "Madam," he replied, "can you tell me of what use is a new-born babe?" Discoveries and inventions which seemed of apparently technical interest alone have often proved of commercial value. When Ramsay first noticed the minute discrepancy invariably found in experiments dealing with combustion of the air, few people supposed that he would quickly discover four new gases and that these gases would prove of industrial interest. Yet, to-day neon or argon is to be found in millions of lamps and helium is a most saleable product.

The inventor leads the academic scientist. It is his task to find the practical use to which discoveries can be devoted. Thomas Edison is probably the greatest inventor of to-day, although most of his inventions are based on the discoveries of others. It was his special genius to make these experiments of service, so that we owe to his efforts, the fact that the gramophone is a musical instrument for the home and no longer a method of physical demonstration.

The commonest mistake of the domestic inventor is to disregard the element of time. Time is the only real phenomenon on this earth and the object of all invention is, directly or indirectly, to save time. When we speak of labour-saving we mean time-saving. The question of much uncharted labour is saved in handling a heavy vacuum cleaner, but undoubtedly no time is lost. Again the total period occupied must be considered. I have in mind an invention shown to me some time ago for which it

was claimed that glasses could be washed at the rate of forty a minute. This was perfectly true, but the inventor had overlooked the fact that it took nearly ten minutes to place the glasses in position, that it would, in fact be cheaper to employ a servant to wash the glasses. The same applies to many ingenious mousetraps worked by electricity. In most cases it is more convenient and economical to keep a cat which requires no time-wasting, self-emptying device.

Utility, and not ingenuity is of supreme importance. The object of invention is to add to the comfort of human beings, either by saving time and thus giving more leisure or by protecting the body from "wear and tear." Civilisation depends upon invention, for without machinery transport, comfort, and certain food, there can be no real thought in any densely populated country.

The savage whose chief anxiety was the procuring of the next meal obviously had no time for invention or the improvement of his mind. The first inventions were probably the result of an accidental windfall, in the shape of a kill large enough for two or three meals, with its resulting time of peace, or the natural desire to protect the food from marauders. Exactly the same circumstances apply to-day. As long as there is no bodily rest there can be no progress. By leisure, of course, I imply time for devotion to the building of the brain as distinct from time spent in securing a night's rest, a meal or the safety of chattels and wives.

It is to the inventor, rather than to the political agitator that women owe their present state of

freedom. As long as it was necessary for them to spend their day performing household tasks and while industrial and commercial work made heavy demands on physical strength, women were subject. But a hundred inventions for speeding up the business of housework and for reducing the physical fatigue of labour gave women the first opportunity for education with results which are the only shame that inventors need suffer.

Invention has reached an important stage. Thanks to the ingenuity and industry of a thousand inventors, we have an almost universal seven or eight hour day. The five-hour system for "workers" is already discussed in America. What will be the effect on civilised human beings? The inventor is making them a gift of the greatest blessing of all ages. Time for thought. How will that gift be employed? If it is used in reading ephemeral novels and watching other people play football, we may await revolution with confidence. It seems that the scientist has still the hardest task to perform; that of teaching men and women that originality, like patriotism is a delightful form of selfishness.

Inventors are often blamed for disastrous over-production in the world. Surely this is illogical and false? Can it be wrong to have too much of anything that is good? If the people who work the machines which make motorcars, jams, sewing machines, and every necessity of modern life, have not the money to buy, that is the concern of the politician. The inventor's task is ended when he has perfected a machine to produce a new article, or some older

articles better and more cheaply. To suggest that we should retain more expensive methods, because the workman receives higher wages for each unit is ridiculous. Obviously even a reduced payment has greater purchasing power; but for the inventor, the "working man" would enjoy a sixteen-hour day, no holidays, and no baths. Invention can cure unemployment as easily as bureaucracy can cure invention.

So great is the power of vanity that there are those who believe there is a point of saturation for invention as well as for humour. This is very far from the truth for the impossible cannot be defined. Inventors are seeking methods for preventing traffic vibration, to secure broadcasting selectivity, silence in domestic machinery, the reproduction of speech direct to paper, stereoscopic cinematography, economical power, methods of employing coal dust, peat and innumerable other principles by which the world can be made fit for other people than heroes.

The difficulties of each case are varied. There is no obstacle to the so-called production of that unknown phenomenon called electricity at a farthing or less for each unit. The trouble is to distribute that power. If a "high pressure main" is used, the electricity has to be converted to a comparatively low voltage before house service is practicable. The ideal method has yet to be discovered, while a cheap and efficient plan of capacity storage is sufficiently important to merit the attention of government.

Is it not artificial light which separates us from

Chinese warfare? The gas-filled lamp is so wonderful that we are apt to consider it as a great invention. Yet it is grossly ineffective, while momentary failure at a power station can plunge the whole city into darkness and disorder. Certain insects, like the firefly, give light with little heat, far more economically than we produce illumination by electricity. The discovery of the nature of "cold light" would be of international importance and a means of employing it commercially is one of the inventions for which the world is waiting.

The whole truth is that while there is thought there is invention. Perhaps "improvements" would be a better word for patents than "inventions." Because invention is the science of continuity, every new patent must be based on one or more old ideas. It is often pointed out that pen and ink were long used by men before combined in the fountain pen. The reservoir pen is an invention based on two old principles. In the same manner television is merely a new construction of previously designed apparatus to produce a novel effect. Television would be impossible without machinery which was known to ancient Egypt, just as radio was possible in the days of Charles I, but for the mental phase and prejudice which debarred it from the human mind.

Very often the greatest difficulty of the inventor is to produce a commercial process. I can never forget that Germany spent £900,000 and seven years in research to produce an industrial method for the manufacture of synthetic indigo. The inventors work

did not end with the discovery of a substance which had still to be made useful. Systems of vertical flights are legion, yet because these systems have not been found to be applicable to ordinary flying conditions, they are worthless. Our aerodromes are ten miles from the centre of cities and our aeroplanes of little value for short distance visits or a tour of pleasure.

One of the necessities of the immediate future is, I am convinced, a Ministry of Inventions. I am loth to increase the number of wasted buildings, but if official investigation and encouragement of inventions was considered necessary during the war, surely it deserves some attention in peace? A machine for carrying people more quickly from place to place is more useful than a device which saves time in killing a given number of men!

A glance at the columns of any financial paper will make it clear that inventions can remedy the difficulties of housing and can construct a dam for depression. Is not this a matter of national importance, and is not the man who creates work for thousands of his fellows as much worthy of reward as the originator of "artificial work" for the unemployed? It is more vital to think of the future than to record the past; yet people live who are more interested in the preservation of ancient buildings than in the encouragement of invention, and it is easier to raise money for folk-dancing than to organise a flag day for science.

Without financial assistance the inventor cannot keep abreast with the developments which are

taking place all over the world. I believe that the time is coming when the public will realise that it is they who have bred all progress and that a Ministry of Inventions should serve the inventor, as he has served the world, in the face of all academic opposition and ridicule.

CHAPTER XIII

SYNTHETIC MATERIALS

THE ATTITUDE of many people who do not fully understand the nature and value of certain scientific discoveries is well shown by the advertisements of jam manufacturers who proclaim that "no chemical preservative is used." They seem to think that the mere fact that no chemical preservative is used to keep food in good condition is necessarily an advantage. True, there are harmful adulterants, but their use is strictly regulated by law. The wholesale use of boric acid and formalin might prove harmful, but there are many chemical preservatives which are definitely valuable, quite safe, and even essential. Is it not better to have good food preserved, than allow it to remain in danger of decay? It is probable that more people have suffered from poisoning by decaying sausages than any addition of synthetic chemicals. Oil manufacturers have been known to claim an absence of acid, when, in fact, this has been an important aid to lubrication.

Such statements really imply faulty reasoning; that the natural product is always better than the artificial product of the laboratory. The same prejudice was encountered by Perkins when he discovered synthetic dyes—no British manufacturer would ever consider his products. To-day every

woman owes much to such dyes which have so greatly reduced the cost of coloured silks and clothing of every description. The synthetic product is as good, if not better, from some points of view, than the natural material, and it is usually far cheaper.

We are now passing this stage in the case of artificial silk. Real silk may still be better, but the artificial product is very young. Many types do not make the pretence of rivalling the real thread though thousands appreciate the point of view that artificial silk is better than no silk at all! The laboratory is a great weapon in the struggle for democracy. It absorbs some article which can only be procured by the wealthy few and gives it in plenty to man and woman. From a purely commercial aspect, it may be pointed out that the artificial silk industry is one of the few profitable organisations remaining to Great Britain.

The making of synthetic silk was almost accidental. Joseph Swan was attempting to produce a filament for electric lamps when he squeezed a mixture of wood and cotton pulp through a tiny hole into methylated spirit. The story of artificial silk from this discovery half a century ago to the present day, is one not only of technical difficulty, but of unbelievable prejudice. It was more difficult to persuade manufacturers and the public that synthetic silk was good, than was it to perfect the process involved. The word "artificial" was the stumbling block. No one would credit that any good thing could come from a laboratory. Now we realise that synthetic silk is one of the most healthy substances

known, in that it does not cut off the valuable ultra-violet rays to the same degree as "natural" cloth.

Now we are going one step further, furs and fancies of the daintiest kind have now reached us by the aid of artificial silk. Of all the inventions during the last half century, perhaps artificial silk holds the greatest potentialities, for it is becoming important to deal each day with more and more synthetic products. Since matter cannot be destroyed, but only altered in form, there is an abundance of material for food and clothing for many millions of additional people in the world. But this food and cloth is not always in the proper form. The furs of animals are only so much cellulose and a forest that can support one hundred animals might produce a million furs from wood pulp. The chemist of the future will be concerned in the commonest elements and in their conversion to useful commodities by the progress of colloidal and synthetic chemistry.

It has now been learnt that antediluvian divisions of organic matter are also artificial. Life seems to pervade all matter, however far its nature be from reality. The bio-chemist, electro-chemical science and other hybrid fashions owe their popularity to the unity of living particles and to our ignorance.

By automatic machinery and by the trigger-like action of electrical movements, effects are being produced which outshine the greatest hopes of the alchemist. We know that infinitesimal discharges can produce changes in substances whose only claim to mineral origin is in the slow rate at which they

spend their lives. We know that the exchange of the most precious and the commonest of metals is almost an accomplished fact. I doubt if the preparation of gold or the construction of synthetic diamond from its allotropic modifications will ever long stand the onslaughts of the laboratory.

The air itself is a storehouse of valuable by-products. Nitrates are valuable fertilisers and many thousands of tons have been extracted from the earth in South America. But the excessive demand for nitrates during the war, coupled with the difficulty of shipment showed the necessity for producing an artificial or rather an indirect supply. The materials were in hand and of negligible cost. The difficulty lay in their combination. Experiment produced a commercial process and now in England a new industry has sprung up which supplies Britain with nitrates made from the free nitrogen of the air. In olden times chemists believed that "natural" products could not be artificially produced. In fact this was the idea behind organic and inorganic chemistry. The discovery that urea could be produced artificially revolutionised the chemistry of the day, and it is now believed that there is no substance in "nature" that cannot be made by indirect synthesis. It is often more economical to use the slowly built natural product of the soil, but we have now definitely reached a stage where it is necessary to consider the possibility of world famine in respect of certain commodities. In the future this problem will be fought with regard to an accuracy of reproduction which now affords the phenomenon of physical

differences in materials which chemistry finds impossible to define.

Many drugs, until recently obtained from barks and plants, are now made in the laboratory, and there is no reason to doubt that the "artificial product" built of simple substances is more pure and efficient than the natural growth. Strangely enough it does not always follow that the utility of a product depends upon the accuracy of its composition. How time has contributed to what are known for convenience as natural substances, remains yet to be properly understood. Synthetic chemistry has opened a vast field of inquiry for medical men and the range of drugs now available is incomparably greater than in the days when trees and weeds were our only source. Insulin, salvarsan, aspirin, avertin, and many local anaesthetics are all the work of the synthetic chemist.

A learned man has recently advanced the theory that mankind might ultimately live on air from choice or by selection. Already many substances can be experimentally obtained from the atmosphere. Carbon dioxide gas, present everywhere in air, is really the source of the valuable chemicals distilled from coal. Nature requires thousands and millions of years to affect the transformation while the chemist believes that he may perform the task in a few minutes. Our very bodies are little more than oxygen, hydrogen, and carbon. It seems that, after all, there was some method in the madness of those who sought for the basis of life when they asserted that earth, air, fire and water held the guide to the universe.

The technician who has discovered how to perform in his laboratory the work conducted so leisurely by the roots of plants, has now to take his carbon and his oxygen with the will to reproduce the "breathing process" of the vegetable world. Already carbon dioxide has been reduced to methane which can in its turn be converted into acetylene. To bring this gas to a tar, consisting largely of benzine, is a well-known chemical process, while benzine is an everyday material in the manufacture of dyes, drugs and perfumes.

The air supplies an inexhaustible supply of most of the necessities of civilisation, even sugar and fat. Why should not the bio-chemical physicist now leave nitrogen alone and now turn his attention to the uses to which the same atmosphere can be put in the ever-increasing field of synthetic marvels?

We have nothing to fear from the artificial products which are shavings off the time of terrestrial saturation. The chemist performs no miracles. He is a part of nature and can but speed up a process which is natural and which the changes of nature demand. Upon the skill of the scientist depends the future of our race, for there is a strict limit to the number of people who can be supported on "natural products."

Even to-day there would probably be famine if artificial methods of preserving and transporting food were not available. Where would we be without our tinned salmon, tinned fruits, and frozen meat? Synthetic chemistry may help man to reproduce these supplies free from interference by climate, weather and tide. I do not question that when we

live in times of advancement we shall laugh at the hides of cows upon the feet of our ancestors and suffer agonies from the new diseases which we, as the quick change artists of the world, have inflicted upon the more certain processes of nature.

Do not complain! it is far better to be attenuated into a being who will choose a friend by mind rather than smell, than to be placed into cold storage by a dwindling sun.

CHAPTER XIV

RADIO AND TELEVISION

MANY people would undoubtedly expect the subject of "wireless" to be dealt with under the heading of "Amusement." It is therefore important to emphasise that broadcasting is perhaps the least important branch of radio. It is not true that aether used to be employed as an anaesthetic, and has now "been put to another use" as I have heard suggested by a famous man of letters. Neither do the suspiciously high-pitched voices of male singers struggling with a negro ditty represent the ultimate value of aetheric radiation.

Few listeners who switch on their wireless sets every night realise how undeveloped is the present state of the art. Remarkable progress has been made, it is possible to buy standardised sets, using current from the main, it is possible to send messages to the most remote parts of the world with the simplest apparatus, and we can even exercise some sort of mechanical control by instrumentality of wireless waves. But much more remains to be accomplished, for many vital facts of practice have yet to be in the least understood.

We speak, for instance, of "beam wireless," but in reality this means little more than a restriction of radiation within very wide limits. Beam wireless

invention can assist another. A practical monoplane was invented before 1850, but it was comparatively useless owing to the absence of the internal combustion engine as a motive power. Flying was made practicable by the motorcycle engine, and other innovations of the future may easily revolutionise the methods of trades with which there is no evident connection.

Another important aspect in which we must consider radio in the dim future is that of power transmission. Many people are under the delusion that real power has already been broadcast by wireless because a target ship used by the navy had no crew. It is essential to distinguish between power and the sending of mechanically selected signals to control power. In the case of ships the energy necessary to drive the propeller, and to move the rudder is still generated by ordinary engines. All that the wireless wave can do is to move delicate controls, so that the vessel travels at full or half speed, and turns to port or starboard. The actual amount of power received by the ship is almost infinitesimal and certainly would not move the smallest rudder ever conceived.

In the same fashion a transmitting station using many kilowatts transmits only sufficient energy to set into action the local power system of a wireless set. The driving of cars and the illumination of streets is still far beyond the realms of physics although there is reason to hope that this is a fault of our own brains rather than that of the possible situation. A electric light can be inductively lit at a distance some yards, but the efficiency of the transmissi-

involved is that of a Royal Commission on entertainment.

Wireless control is of importance and may have extensive use in the future. It is not hard to visualise postal air liners controlled by wireless from the ground; saving the cost of a crew, and flying so high that great speeds would be possible without danger to regular passenger craft. It might also be possible to employ convoys of which the parent alone carried a human crew to guide the remaining ships by wireless.

The production of power for driving motorcars and lighting houses may only be a matter of time and experiment. The discovery of "cold light" would revolutionise our ideas on this subject since there seems no reason to doubt that far less energy would be required to maintain such a system.

Illumination might then be broadcast from a central station with an immense saving in the cost of overall production. In this manner it would be possible to have light broadcasting stations at the pit head. The time may come when radio energy is a feature of industrial development and when the political situation is gravely embarrassed by neutrals who object to or steal the energy which dominion waterways send to our housewives. What an opportunity for the alleged humour of Ireland.

Closely connected with this subject is that of the death ray. Scarcely a year passes without the announcement of the discovery of a machine to kill people by wireless in some mysterious way. It is so obvious that such an invention would possess vast

commercial possibilities and so clear that the authorities were often deceived in times of war, that inventors chose the miracle of radio to disguise the impracticable nature of their invention. The case is similar to that of wireless delusion, in which the patient imagines that radio fiends are following her or him with their troubles. Unfortunately the brain does offer possibilities as a detector so that it is difficult entirely to deny the vague difficulties under which human beings may suffer.

An electro-chemical effect which can reduce body temperature or assist a process of fermentation by the provision of emanations so slight as to be virtually undetectable, may even change the characteristics of the human mind. No real explanation has been offered as to the causes of the symptoms observed when an oscillating current is applied to the head. We know that colours can be induced in most people, without contact, when a rapidly changing current is carried through a coil worn like a hat, but the phenomenon has not been satisfactorily explained other than by a reference to the electrical energy which appears to account for all nervous sensation.

The boldest of medical men might hesitate to suggest that radio can affect health and weather, but it would be equally foolish to deny that some changes must be produced by the dissipation of energy in these channels. When I am told that a chicken can be produced from an orange or that wireless chats with "Martian" women are easy, I always adopt the reply—"Splendid! I will provide the orange." As far as Mars is concerned I have met no women,

and, if as is reported, they have two thumbs, I fear them; for doubtless one husband under each of these appurtenances must be the rule.

But these experiments do not help us to create a death ray. To kill a man at a distance or even to upset the working of an aeroplane engine requires a considerable amount of energy; far more than we can transmit by wireless at the present moment. If anyone can produce a "death ray" which lacks this power, they would make more money by selling it to a commercial company for use as a selective signalling device. Such companies require more extensive demonstrations than one accepted by a Government during any crisis. This indeed is the history of the "death ray."

It is more probable that the war of the future will be conducted by men, and certainly by women, from underground cities with destruction operated by automatic mining tanks. Bacteriological bombs, submarine-cum-land vessels and frightfulness, will be well developed. Airships may be omitted for they are dangerous alike to those who travel and pay. Man judges life in terms of time in spite of Einstein.

It has also been suggested that sound might be used for destruction, although it is extraordinarily hard to achieve a limitation of direction. It is true that experiments have shown that fish can be killed by a sound wave, and that man can be annoyed by loud speakers, but water is far less resilient than air, and it is more than doubtful whether we shall ever produce a sound sufficiently penetrating to disintegrate matter. On the other hand noise played

a very important part in the last war, and it is possible to make people physically sick by certain noises. In any future war sound will be increasingly important, and when armies are so highly developed that they can think each other into panic, noises might be sufficient to win the day. Broadcasting as we know it, has other uses in addition to that of entertainment.

There is no reason to suppose that wireless will always be limited in the main to the reproduction of sound. Already we have television of an experimental kind and we may well progress towards "tele-sense" and "tele-smell." A fundamental fact that is often overlooked is that no one has ever heard another man's voice by wireless. What he does hear is the mechanical simulation of part of that voice. If, therefore, we can mechanically reproduce sound and sight, why should we not eventually imitate smell and touch in a similar manner? Such reproduction is essential to reality, for we depend upon other senses than hearing and sight to gain our impressions. The sense of smell is only the signalling of nerves to the brain and there seems to be no reason why this effect should not be electrically induced. Following upon this it might be expected that mind reading should become a scientific rather than a commercial enterprise. This should cause no astonishment for alchemy and the transmutation of the elements have already undergone this change.

Any method of transmission which avoids the need for bodily presence is greatly to be encouraged. Science is a wonderful comforter for it must soon be

possible to choose the particular sense to which any event will appeal. Of singers there are many kinds but it would be delightful if a button gives us the power to decide whether we will look without listening, listen without looking, or, in exceptional cases rely entirely upon touch.

So little change has taken place in the main valves of radio knowledge that at present, the most moderate advance is at a cost of many highly technical difficulties. In the case of television announced some years ago, and actually demonstrated in this country before the war, its practice has not yet become an everyday affair. Consider, for a moment, the mechanical nature of the problem. Television, like the cinematograph depends upon illusion. When we see a film, we do not see actual photographs of moving figures, but a succession of images which appear to be continuous because the eye cannot appreciate periods of change of less than about one-twelfth of a second. Thus a cinematograph film showing sixteen photographs per second appears to be continuous or to possess an infinite number of images.

The problem of radio-vision is somewhat similar. It is necessary by means of illuminated spots of varying density to produce a number of images sufficiently rapidly to appear continuous. Each whole picture must contain a tremendous number of the spots, in order to appear real; it is like a photograph reproduced by half-tone in a newspaper, and each image must be completed in about one-sixteenth of a second. The number of delicate movements which have to

be made every second is colossal and the real reason why television is still in the experimental stage is that great difficulties are experienced in producing speedy apparatus. The images flicker because there are not a sufficient number per second, and blur, because the spots are not sufficiently numerous. It is only a matter of time, however, before we have perfect "half-tone" or even colour images, synchronised with sound and projected by some novel system of wireless selection from every aeroplane as it flies round the world.

The supposition that the working of the brain is electrical and the discovery of the great part played in all forms of life by electric oscillation still suggests that wireless may have some control on growth and health. It is alarming to think that congested streets may affect the birth-rate, but it is now claimed that workers in factories dealing with short wave wireless transmission show a tendency to abnormal fertility. Stories of gigantic marrows grown under wireless aerials can generally be discounted and otherwise explained, but I have never before observed the need for an inspection of the wireless stations owned by the proletariat or clergy.

It will not be long before the aether is filled with oscillations of every kind and it might be a matter of great importance to discover what effects, if any, these oscillations will have upon human beings. It is possible that short-wave radiation may be discovered to be useful for massage of the brain in the same manner that colour or movement can deal with an eye or a muscle.

If the nature of accidental movement determines the existence of matter, the same principle may gain a significance which would delight the alchemists of a mediaeval magician. Discoveries in this direction may arise from the transmutation of metals for Rutherford has shown the possibility of using the alpha particles shot out by radium to "knock out" the portion in the nucleus of an atom. The discovery of economical methods of elemental conversion would enable the whole world to be regulated upon scientific lines.

Be it remembered that the result could hardly be worse than organisation upon any other scale. Radio communication is bringing friendship to the world, it has negated the moral censorship of a kindly bureaucracy, it will help us to enjoy the forbidden fruit of the Continent in our own homes.

Our methods of reproduction are now so good that most of the most delicate effects of lip wagging cannot be taken direct to the brain. We need a more personal method in order that our minds may no longer be agonised by different music in each ear. We must have an outlook so broad that the description of a murder in Timbuctoo is as titillating as that of Clapham. Science has a universal policy which transcends that of any empire.

Teaching is of little purpose other than to train the intellect to receive its own impressions and of less, if the listener must be irritated into mental convalescence, I believe that the great public prefers Sullivan to Symphony and that many a set would be destroyed if social pride did not demand the aesthetic acceptance

of chamber music or of the literatum who has discovered a novel medium.

Hans Andersen once wrote a story which I commend to every compiler of a radio programme. Two thieves asked their Emperor for silver and gold wherewith to spin a cloth so fine that only the clever people in the Kingdom could see its beauty. The Emperor sent his councillors to view the material. They saw nothing, for the raw material was safely banked, but were determined not to admit their stupidity. During a public procession in which the Emperor walked naked, while courtiers held his imaginary train, a child was heard to say—"Mother he has no clothes." I think that when we listen to most English composers we are worse than the naked.

CHAPTER XV

RELIGION

IN SPITE of the sectarian Churches there grows each year a closer association between science and religion. The discoveries of the last century and the "Descent of Man" were, until recently, considered to be incompatible with any religion. The more orthodox and artistic Victorians spoke as if the words "Scientist" and "Atheist" were synonymous. To-day we rely upon Bishops for the discussion of birth control, and upon the scientist to shed a more intelligible light on the Bible. There is no doubt that the biologist, or the physicist who has studied the structure of crystalline form, can give a "revelation" more beautiful than that of the fanatic evangelist whose sole qualification is a blind faith in something that he does not want to understand.

It is possible that if the ministers of religion had embraced science in the last century there would have been no such falling off in the number of their followers. That the various Churches have lost thousands of supporters during the last thirty years, there is no doubt. They have themselves to blame. The boy who learns some of the wonders of nature at school and has acquired the habit of analysis is naturally suspicious of "faith" as laid down as part of their belief by many of the clergy. I am always

with their characteristically oriental request for fatherless children? Is not sacrifice beneath the dignity of an infinite power? Even the Bible, the best seller, is more clever, for it speaks of a being of infinite compassion and tells us that a thousand ages are but a moment.

So beautiful is the allegory of these thousand ages that in them I fail to see the discrepancy between science and religion. A scientific religion is a life of endeavour. If we are conscious of our limitations, we can explain the terrors of disease, the antagonistic attitude of a mother with a sick child, and the reason for the over-development of the elephant's trunk. If you will let me say that God stands for the all-prevailing power of Nature, then I will believe, prove and teach, that God is Love.

For centuries the Church persecuted those who attempted to learn a paltry few of the truths of nature. Established religion has so feared science that it has tried to obtain its suppression. Even in these comparatively enlightened days, I believe there are many who think that to experiment is a sin. It was not surprising therefore that the revival of science in the last century has resulted in a large number of people declaring that science proved there was no life after death. The position is less acute to-day, and it is being realised that to be a scientist is not to be material. It is the gross materialism of established religion which is bringing their performances to mockery. Science can prove that there is life after death—I do not imply conversations with the "dead" or the neglect of time, but in the

same way that it can establish the indestructibility of matter and energy or the existence of both in the tremblings of the aether by the instrument of our personality.

It has been argued that our bodily death writes "finish" to our mind on the ground that an anaesthetic produces apparent unconsciousness. If chloroform is death, what is the awakening from this apparent end? Does it not rather prove that our minds can function without respect to the ideas of time that habit has impressed upon us? The very time of death is a matter of opinion. It is a slow process, so slow that it may never be complete, so gradual that it lasts throughout our conscious life. We are all dying, as well as living every minute of the day. There is no reason to believe that the blowing of a brass trumpet will reunite our rotting bodies, but it is not illogical to conceive that a process of reconstruction as slow as that of disintegration may continue for periods of time beside which our geological ages seem as seconds?

This should provide a hint, and is more convincing evidence that the world is not an experiment of some super-being who may wipe us off the slide of his microscope at any minute, than blind faith. A fly caught in a bottle has unbounded faith in its ability to escape and its refusal to acknowledge the existence of the glass reminds me of an evangelical sermon. A few years ago an atom was considered small, but to-day our changing mental outlook renders the atom large beside the electron. To some other being of greater mentality than ourselves

for death knows no period in our mind, the apparent inconsistencies of nature are no longer paradoxical. Nothing in nature can ever clash. A woman may spend hours matching coats and hats, but we do not see flowers in a natural background which can hurt our aesthetic susceptibilities.

It has been well established, I think, that the process of thought is mainly electrical and if this is true, some form of wave must be emitted during our lives and our thoughts. Nothing is destructible. These waves do not cease, although they may not exist to us; merely because we have not the intelligence or the sense necessary to detect them. No one could say that bacteria did not exist because they are usually unseen; therefore we should not deny that by means of some machinery we may eventually detect the waves of thought. If these oscillations are produced, differing in each case like the leaves of a tree, it is not absurd to suppose that they may be superimposed upon the natural wave of life whose origin we cannot profess to compass.

Surely this is the only explanation of fate; in that by encouraging the desire for improvement we can vary, as we should say in wireless terms, the "modulation" of the stream of life.

It is necessary for the ordinary man to make up his mind that religion and science must agree. Religion must cast aside some of its picturesque, but meaningless shibboleths. It must not suggest in one part of the Prayer Book that the soul is the only part that matters and in another that ~~man is~~ only "until death us do part."

Instead of fighting science, I think that religion can find in it the best demonstration for the need of religion and the hope of an after-life. If death is merely part of nature's process of rebuilding, and if the continuity of the intellect is assured like any other natural characteristic, we need not fear death. True, we must avoid a false attempt to superimpose ourselves upon the time wave or to attempt to alter that governing factor, but we do not hesitate to sleep and we never know for how long we have slept. Is this not a more reasonable attitude than to pretend that death is welcome because we shall spend the rest of time "somewhere" singing endless hymns to the God who created us and destroyed our bodies? Scientists are not so vain in their admission of God as the religionist who knows that his Maker will condemn his enemies to torment, as an expression of dislike to the phraseology of a certain Prayer Book.

Young policemen, the sight of many books and the sound of a bell, remind me of death. It is the business of the Church to forget the appointment of a new organist and to tell me that it is only the unknown and the dark which I may rightly fear.

I may not logically possess more than one opinion upon any subject, but God forbid that it should be one which denies the capacity of love in dog or man to bring lasting life to the whole structure of appreciation for which I have fought. It would not be easy to watch for death in the hearts of those who make our existence worth while if we knew that we could take nothing more that is offered in sympathy than a purse, a photograph, or a memory.

I deprecate the idea of miracles in an age when living creatures are known to emit rays which affect their kind or when certain plants can induce a desire for growth in a similar organism. It is distressing to imagine that the immaculate conception can be explained by the presence of onions, nor would I agree that the beauty of normal birth is in any way unclean. It would be more suitable to devote time to an investigation of the manner in which death can be rendered less vague by the preservation of sperm life in the fashion of a seed. Even a knowledge that disintegration was no more than the assertion of individualism by the cell would be welcome. The fact that contemporary history seems to have been not greatly affected by the presence of Christ, or that our conception of the deity must be as amusing to the Almighty as that of a Malayan God to ourselves need give no cause for anxiety.

A belief that real religion, real good and real progress can go together is worth a struggle. It is a logical and technical argument which might convince the worst murderer, and it is an explanation of the universal longing for that peace of God, which in our lifetime, passes all understanding.

CHAPTER XVI

THE FUTURE

ONE CENTURY ago the greatest interests of the world lay entirely in the past. The "education of gentlemen" consisted in the absorption of dead languages, history, to within fifty years of the date of his birth, and occasional philosophy from ancient writers. Science has taught us, however that although the past may be useful in order that the curve of the future may be more accurately produced, that which must come to us by the instrument of change is alone important. It was thought vulgar to predict any happenings until one found that we could do little else in our ignorance of what time might give us the truth.

There is no present, the plotting of curves of tendency is a scientific process, it teaches that our earth alters in each instantaneous movement, it is the method alike of the scientist, the bookbinder and the builder of roads. How else did we first conceive the point of liquefaction of hydrogen, the price of bread or the futility of those early theories upon the elements?

A man is still considered socially bearable if he can read Latin and Greek, even though he cannot explain what happens when a candle burns in air.

As a mental exercise the classic languages are sound but mathematics develop more serviceable faculties and are much less distressing to our friends.

If we believe in evolution, I do not necessarily suggest that of Darwin—we must also credit that the future is the period to which study might be directed. The whole world is moving into a better orbit. It may take thousands of years to bring about the smallest change, but this is of no matter in comparison with our need to visualise and encourage progress. It has been calculated that if we take the lifetime of the earth to be seventy years, man is still a brat in his cradle! Let us encourage ourselves to be a little less savage than we are today, when we bare our dog teeth in a snarl if someone treads on our toes in the morning.

The future of the human body alone is an intensely interesting and important subject. We carry with us some sixty reminders that we were once "animals" or "fish." Embryologists have described how the human embryo begins like a fish, and passes through all the stages of evolution until it becomes a baby, as we speak of it. Yet in that fish, is the germ of the brain that will devise machines, to master every animal and cope with the forces of nature herself! Is it not probable that many thousands of years hence embryologists will point to a "period" specimen embryo, and say: "You can see the characteristics of early man in this embryo." "Of course, these have been lost although there are indications that heads probably had some hair and some are agreed that teeth were found."

To imagine that the human form will remain a thing with a body, two arms, two legs, a head and five senses is to be blind to all lessons of history. I can never make up my mind whether man in the image of God implies the cave type or that of a racing motorist. Every time we are giddy or sea sick, we should remember that the cause is the peculiar balancing organs in the ear which the human race brought with it upon emergence from the sea. Our senses, have in some ways, become less active. If we could hear like an antelope, or smell like a dog, we should find life intolerable. If our eyes had great powers of magnification, we should hesitate to drink a glass of water because of the bacterial life that would be revealed.

It is almost an accident that we cannot see through brick walls. When we speak of substance being opaque we mean that it is only opaque to human eyes. If the nerves of the eye were sensitive to shorter wave lengths we could look through a wall, and might find glass opaque. Think how this would alter our morals? In the same way the eyes have grown from a sensitive patch of skin, so later we may develop new senses and "see" with other organs. Even now, there are some men who can "read" large letters by placing them against the chest. Some blind persons can distinguish colour by touch, all of us can hear through the bones of our head.

The study of the past and present is only the prelude to a study of the future. Looking forward is not an amusement but a science. If you employ a crystal and describe the events of partial coma

you may justly be arrested, but if you take a graph and plot the past against time, you will find a curve to indicate in a scientific manner the possible developments of the future. A war or other catastrophe may reduce the rate of progress unexpectedly for ten years, but on your squared paper ten years would be a pin point. With this method it is reasonable to see a very real and useful picture of the future.

Consider some lessons of the past. Remember that only twenty-five years ago officials in the War Office reported that heavier-than-air-flying would be of no use in war or peace! Remember also that wireless was considered a plaything and that even experts said that it was useless to the world. Men have been burned for claiming to turn lead into gold, but now this experiment is attempted by hundreds of serious philosophers. The elixir of life was the butt of the 19th-century scientist, but to-day Voronoff and others suggest that there is no reason why men should physically die. Three hundred years ago witches were burnt in "Merrie" England at the order of a sensible jury. Parliament suggested fences to prevent those working in the field from being terrified by passing trains.

It is very easy to fall into the attitude "We know everything." Unconsciously it is easy to think that what we cannot see, does not exist. The microscope and telescope have proved the fallacy of that idea for there must be much that even the most powerful microscope cannot detect, there may be thousands of nebulae invisible in the giant telescope on Mount

Wilson. The earth may be but an electron in an atom forming part of the hair of some giant, it may be a cell in the brain of a police court missionary or Lord Mayor's coachman. I do not say these statements are true or probable. "Possible" is the only word of which the application is ever safe.

The curve of evolution suggests that man's brain will develop, while his body will in some ways gradually atrophy. It is becoming less and less necessary for us to use our bodies every year, and more and more necessary to use our mind. It is one of the rules of evolution that an organ which is unused owing to environment gradually atrophies. Primitive man would probably wonder how we managed to exist to-day without arms that could carry a stag. Mechanical transport has largely eliminated the necessity for big calves and big biceps. So we, perhaps, wonder how woman could live without legs. Yet probably the man of the future will be far better off without these appendages. Artificial means of locomotion now takes us more rapidly from place to place and leaves our brain free to work, untrammelled.

The whole trend of evolution seems to point to the fact that the brain is the most important part of the body. Animals are nearly all body and very little brain, so perhaps man of the far future will be nearly all brain and very little body. For this reason he will have everything brought to him. Even to-day we have our entertainment by the fireside. In the future we may have the broadcasting of three dimensional films with, perhaps, appropriate scents

to add realism. It will be possible, if undesirable, to be in constant touch with everyone by means of pocket wireless and we shall not allow human activities to be influenced by such occurrences as a sunspot, many millions of miles away, causing rain. Streets will be inductively warmed, and roofed for the comfort which is now so necessary for serious life. It does not follow that street vehicles will have round wheels when metal plates might supply the act of repulsion. We shall be so immersed in protected thought that artificially lit, underground, noiseless dwellings will keep us immune from everything but taxes, or visitation from another world.

As man assumes greater interference with the forces of nature, he will have more pressing problems to solve; if he wishes to avoid annihilation by his own devices he must attend to the development of his brain, by transplantation, sex selection, new foods, or even education by mental influence during sleep. Food must certainly be taken in the form of communal electric treatment while the skull is protected from all shock.

If we learnt to control the local weather for example, as is implied by certain experiments with electrified sand, who is to assume the responsibility of declaring when it shall rain? If we leave such matters in the hands of hereditary legislators it might well be that someone whose ancestors were successful in stealing land would be able to keep Friday fine because he was giving a garden fête. To hell with the farmer, he can wait for his referendum.

Such problems as these suggest delightful possibilities to modern man; but imagine what a savage would think if asked to organise the business of a modern multiple shop. It is because the ethical idea must keep pace with the progress of science that it is so important for everyone to understand what is yet to be done and not what has already been accomplished. To-day in fashionable drawing-rooms, to admit ignorance of the latest novel is a crime. But to say that you do not know the function of a carburettor in an internal combustion engine or how a sunset is caused by dirt is to adopt the pose of success and to admit that effect is greater than cause. Oysters have the faculty fully developed.

During the past decade the rate of progress has become more rapid. A thousand years ago, very little might have happened in a century. To-day we have only to think back to 1831 to realise how much has come to pass. No electric light, no motor-cars, no telephones, no wireless, no gramophones. Railway engines were monsters that made the country folk run for their lives. Mentally and mechanically we have progressed a great deal further than any of the much vaunted ancient civilisations over a comparative period. Further, it is unlikely that any one system will now be "blacked out" like those of ancient Greece, Rome and Egypt. Transport has become so rapid that a disaster in one country reverberates throughout the globe. The War did not provide a Roman holiday for the barbarians, although it is interesting to note how

other countries assume it to have changed the direction of German thought.

It is curious to find in this age of rapid and comfortable transport which reminds us every hour of the day that the present is so much better than the past, that many people are still concerned about ancient buildings and ruins. It is easier to raise money to preserve some ancient house where Queen Elizabeth is alleged to have stayed, than to obtain the same sum for research into the cause of cancer. Thousands pay sixpence to see Stonehenge, but would scorn to walk free into a Museum of science. Even the time-honoured fable of the Pyramids holds the minds of those who cannot grasp that these building sites of the future covered world, could be erected by any contractor to whom life and trade unions were unimportant.

Many a man who quotes Terence or Cicero to a nicety, cannot explain the working of the press which produced the book in which he learnt that language, or of the motorcar which takes him to the electrically-heated library each morning. An education founded on the assumptions of history is useless. We must in duty bound prepare ourselves for change in order that our children may inherit a mental make-up which will allow acceptance of a very different world.

I fully believe that the proof of progress is the proof of our hopes for paradise and I am sure that such relative horrors as state-incubated children, hairless, toothless and jelly-like flappers with still more over-grown heads, are only phases to which the world can look forward in confidence.

What reason have we to think civilisation will stand still? It is more likely that a most unpromising child in five centuries' time will look upon his great grandparents, twice removed, with something of the pity we now keep in store for the pigmy inhabitants of Central Africa. Of our customs and habits he will never speak in respectable mental society.

The world is very savage to this moment! We fight like cats, tear the rotting flesh off animals without teeth, rejoice in tails, live in warrens and breathe the excreta of animals in the street. A few years ago we dipped limbs into tar after an amputation and advised the use of crocodilia as a specific. We may yet succeed in the curing of a cold.

THE LAW AND TRUE SOCIALISM

THE LAW has no historical reputation for wisdom or mercy, a circumstance little altered by a complete neglect of scientific discovery. Honest policemen test noise, but while technical evidence is usually represented by witnesses who are asked their terms as a measure of precaution. No one dare suggest that aural sensitivity is varied by an empty stomach.

The products of science have always been pursued with delight. Motorists were harassed for a quarter of a century. They were prosecuted for scorching at eighteen miles an hour until such atavistic regulations became the laughing stock of educated people, who realised that there was no essential connection between speed and danger. Selfishness is the main cause of accident.

It would be logical to prosecute those who travelled slowly. In this age of speed, one horse-drawn dray wastes hundreds of pounds from the pockets of delayed men and women. Why not arrest everyone who travels at less than ten miles an hour; some American streets enforce a minimum pace?

We are now experiencing a number of prosecutions for indecent dress. Thames lock-keepers are instructed to turn away boats of which the occupants show an undue amount of bare flesh; but the poor keep

has been to a Polytechnic and knows that vulgarity is a factor of the mind. Is the exposition of two square feet of back indecent, or is it only apertures of the body which are taboo? Noses are horrible things, full of hair and moist. An eye may be beautiful on account of setting or its absorption values, but itself, certainly not. Appearance, morals and opinion are not positive, subjective or protoplasmic. They are environmental. The only logical method of determining the point of indelicacy would be to test the heat value of a chorus girl's blush with a pyrometer or to decide the number in skin inches which, when checked by planimeter would allow prosecution with certainty. Audiometric records of kissing would indicate the degree of passion permitted by the Church Assembly. I am forgetting that they could never agree.

The continental police are more logical, and I believe are provided with tape measures to ascertain the distance from the ground of any doubtful skirt. Obviously if we are going to have laws regulating morals, they will have to be scientific. How can any normal man judge whether a picture is decent or indecent? Work has no right to be a pleasure. The matter must be guided by his personal feelings, and there is no reason why these should be inflicted upon other people. A jury of averages is an impossible counsel, the substitution of mechanism an utopian dream.

Eighteenth-century laws are often useless for a 20th-century public. It is still illegal to open shops on Sunday, yet they are open everywhere. Modern

industry has demonstrated the wastefulness of a six-day week. Do those who advocate a Sunday of workless rest "turn off" gas and light at the main? I doubt it; but the use of these necessary commodities implies that others are labouring for the common good. If we need new comfort we must be prepared for new law. Imagine the rushing feet of hundreds, not women who have chosen to be gentle by labour, but those who need liquid sustenance in a neighbourhood in which "closing hours" are extended.

Again, why should it be illegal for cigarettes to be sold after eight o'clock but perfectly normal for a slot machine to supply his needs. The only advantage of this silly law is that inventors have been encouraged to experiment with automatic devices and that the shops of the future will largely operate on this plan. There is now in existence a machine which will sell goods at any price, even with odd pennies and halfpennies, and return the proper change for any coin. This is better than permitting men, with presumably immortal souls to waste their lives handing out matches at a counter. Women do this also.

Was there ever such a ridiculous system as that of precedent in judgments. If I invoke the law to-morrow I may lose my case because some judge in 1831 pronounced a judgment on the subject! Conditions have altered since 1831 and call for different views. It is absurd to admit the infallibility of a single person, long since buried, upon any point. Our brains are not sufficiently developed for infallibility in any other than the Pope. The scientist is always more modest. He should preface all his dicta upon

biology, evolution and psychology with the "in my opinion."

Can there be any possible explanation absurd idea of allowing someone who is caught with the stealing of a watch to plead that he was not in the house at the time, or that if he did steal the watch he thought it was his own? Is it better because it is administered by men who curl up animals' hair, and gowns that collect dust of the courts? According to our present standards it is often cheaper to drink until the only remaining thrill is that of beating a wife, than it is to eat sandwiches in a bag after nine p.m.

Divine law is beyond comment by normal people for we not only encourage the committing of crimes but help to develop its after-effects by refusing to prosecute when this may well depend upon a selfish calculation of one of the parties.

It is equally difficult for the scientist to be put up with the social standards of our much vaunted civilization. Is it possible, in any scientifically ordered society, to read on one page of a newspaper that a horse is falling down for lack of funds, and on the next page that Lady Bloggins has given a ball where guests wore jewelry to the value of £100,000? I am sure that the waiting line of cars for the Royal Ascot should be numbered, and programmes sold to support of the Army.

The absurdity of professional standards from an ethical point of view was well illustrated a few years ago, when American golfers attacked the British in order to win a number of useful prizes.

proceeded to drive new golf balls from the roof of a fashionable hotel into the Thames. At half a crown each, they were passing over the heads of men to whom that sum may have meant the difference between life and death; yet the balls, like the men, were allowed to remain in the river if they desired. Yacht racing helps to multiply these instances indefinitely.

The rule of the masses has resulted in a standard of values that is more snobbish than that of an oligarchy. I believe that unless it is possible to encourage the creation of a scientifically minded world, rather than the forced memorising of the probabilities of biology or chemistry, chaos must result during the period of transition.

Socialism has never been tried. It is absurd to threaten without courage to strike. Capital to-day can afford to wait. Money is too terrified to leave its bank, and not enough has been taken by robbers to give them a lifetime or a session, of security.

Semi-socialism is as foolish as an unfinished war. No strike has been maintained in a loyal spirit. Fools have listened to those who report that "Lord Stumerholme is skilled in the driving of a bus," without asking how much he would pay not to do so for the remainder of his life. Miners have coal to sell. If we want it let us pay the equivalent of our bribe to prevent us from risking our skin.

Democracy in times of war is even more amusing. In olden days we marched to an enemy's castle becoming thinner and more ragged each day. Capitulation on the part of the hated rival brought

good cheer, which as every man knows means food, drink, and women. Modern warfare is less sensible, for having reached the point of tattered starvation, we shake hands and return to our homes entirely unprovided with "cheer" in any shape, or for that matter, "form."

There is a story of an ancient prelate who always instructed his gardeners to follow his footsteps, and those of his mistress, in order that these marks might be obliterated before the morals of the populace could suffer. Perhaps he was the father of modern society in his anxiety to conceal the obvious in progeny by presumption.

In a time of enlightenment we are equally strange for we can welcome the happy pair who, "being able to afford it," have spent a few moments in a dimly-lighted building at an arbitrary hour, in the sacred name of standardised morality. When I see a definition of morals can fall within communal scope I no longer wonder that our present scheme admits of distinction by name alone.

I suppose some people expect to educate India and to express surprise that these people no longer content themselves with rice or service. Nothing should cause alarm when we can read that the people's God is pleased by a golden chalice instead of a rebuilt slum. Mental uplift at the cost of bodily degradation is too savage even for a futuristic sculptor.

The world must suffer its revolution in every sense. It is recovering from the climax of feudal times when the serf was proud for his daughter to

enter the oldest profession under the tuition of his lord. None of us are greatly shocked at the idea of cutting a pig's throat and tearing out its entrails for our food; although we are very ready to disguise our bestiality by words of which the rhythm is still considered more worthy than the meaning.

The time is at hand when the "Collapse of England" will mean more than our usual failure in International sport, and I believe that in this change we shall see the beginnings of true emancipation for women. Even murder is now the prerogative of those who cannot distinguish between a "gentleman" and a man who is educated.

We have all learned that emotion is commonly vulgar, that the wearing of masks would be serviceable at any public function, that princesses can be grown like pearls, and that many of the wrongs under which we suffer can be exchanged for others as yet unknown. We will find how the curse of Eve can be relegated to the man who at present endures its periodic attack on peace of mind, progress and cash. We used regretfully to remark that our sons might end as soldiers or omnibus drivers but are now hopeful of securing a post for ourselves in either capacity. Over population is very trying for those who indulge in this sport.

Our planet is still so young that it has not had time to cool, so we can enjoy, still, a few years of retrospective emotion and mascot religion. It is said that a fisherman replied to his Bishop who had asked the nature of his belief, in the words "I sticks to the old Church and be damned to it." I -

proves a most comforting, though improvident, method. Let us hope we never receive all that is deserved. Christ lost no dignity by any gentle answer.

New worlds are being born in the universe. The little speck which we profess to know is crumbling with each breath and it is upon everlasting change that we must trust, if rest is an eventual object. Sympathy is so rare that one might long to encourage it upon a professional basis. Its lack has bred a bitterness of spirit which the ignorant worship as the laws of survival and of nature.

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